The Interests and Pleasures of Life for All Indoors and Out

What These Pages Show Us

ALL work and no play makes Jill a dull girl and Jack a dull boy. If we would be healthy and wise we must go bravely and merrily to our games. Here we shall learn how to play them, to enjoy ourselves in a hundred ways, whether in the long winter evenings by the fire or on the lovely summer days in the garden or the field. We shall learn many ways of using our time and doing things with our hands. What a boy may do with a little box of tools or a girl with a needle and her clever fingers, magical illusions, conjuring tricks, puzzles, problems, and simple scientific experiments will give us entertainment here of which we shall never grow tired.

THE WIZARD'S HANDKERCHIEF

WE are going to make a coin disappear out of a handkerchief. We will suppose that the trick is to be performed with a penny. The handkerchief used is a coloured one, and the wizard's own property. The conjurer gathers up the four corners, and has the penny dropped into the sort of bag thus formed. He proves that one coin is really there by making it chink against the table-top, or allowing somebody to feel it through the handkerchief.

But presently he says: "Penny, vanish!" or something to that effect, and the coin forthwith departs. The handkerchief is shaken out, but nothing falls. But the performer explains that the coin has merely stepped round the corner, and will come back again if desired. Again he gathers up the four corners of the handkerchief and says: "Penny, come back!" Again he makes it chink upon the table, and allows anybody to feel that it has really returned. He now says: "Penny, pass into that vase upon the sideboard," or any other place he likes to mention. Once more the coin has disappeared, and is found where he has told the audience that it would go. The secret here lies in the handkerchief, which is one that has been specially prepared for the purpose of the deception. If the young reader is a boy he will have to get someone to make it.

The pattern of the cloth of which the handkerchief is made does not matter, but it must be double, being, in fact, two handkerchiefs of the same pattern sewn together all round the edges, save for one small opening. This is at the corner B in the picture, where for a space of an inch and a half each way the two handkerchiefs are not joined together. This leaves a space between the two handkerchiefs, and this space is the secret of the trick. The two handkerchiefs must also be joined together by a diagonal line of stitching from the bottom of the opening at B to a point an inch short of the corner C. As it is important that this line of stitching should not be noticeable, the handkerchiefs used must be somewhat dark in colour, and the more intricate the design the better.

When it is proposed to show the trick the first step is to hide a penny beforehand in some convenient place, to be found there, when necessary, afterwards. The handkerchief must be held in the first instance spread out four-square, the corner A between the thumb and fingers of the left

hand, and the corner B between those of the right, but with the little mouth at B kept open by inserting the tip of the forefinger in it. The performer then gathers up the other corners one by one into this same hand, forming a sort of bag. He then asks someone to lend him a penny, and to drop it himself into the bag thus formed, in reality offering him the opening at B, so that the coin actually falls into the space between the two handkerchiefs.

To avoid mistake, it is well to hook both forefingers into the opening. The coin may now be made to rap upon the table, or be felt through the handkerchief. This done, the performer lets loose the corners C and D, but nothing falls, the penny running down the line of stitching to C. By picking up the corners the coin is brought back to the centre.

The performer now orders the penny to go to the spot where he has placed the duplicate coin, and once again shakes out the handkerchief four-square.

He then drops corner A, and with the left hand takes hold of corner C, holding the handkerchief straight up and down, and giving it a shake as if to call attention more forcibly to its entire emptiness. While the attention of the spectators is occupied in seeing whether the penny has reached the place he works the first coin through the opening into the left hand and gets rid of it.

If you perform the trick neatly, you may be asked to do it again, but it is seldom wise to do a trick twice over before the same people. Should anyone press for an *encore*, your best plan is to exhibit instead some trick more or less resembling the first one.

GENERAL WAXVESTAS AND HIS FAMILY

THE general and his children in the picture are simply made of wax matches which have had their tops burnt off. Let us look at the general first. A glance at picture 3 will show how he is made. The match which forms the body has been pulled apart at the top to form the hair. The head is made of a little ball of sealing-wax. Two more matches are warmed at the ends (to make the wax sticky) and stuck on the body for the arms, and another one is fixed to the end of one arm to form the sword. The legs are fastened in the same way, but they are bent a little at the knees, and the scabbard is also fixed on by warming the wax. If this is well done and properly arranged it will make a support for the little man, who will then stand by himself. The eyes, nose, and mouth must be drawn in with a pen.

The little girl who is running away from the fierce-looking general is made in the same way, but, of course, the matches have to be bent differently; picture 2 shows us how. Here one bent match does duty for both arms, but to make them look alike the top must be cut off. To form the skirt, make some red sealing-wax warm and stick it to the wax matches, bending it with the fingers to make the shape. The umbrella shown in the picture is also made of sealing-wax, warmed, shaped, and stuck on a wooden match, which has been cut in half and pointed at one end. Fix the umbrella to the girl's hand by warming the wax match which makes the arm, and sticking the match and umbrella together.

GENERAL WAXVESTAS AND HIS FAMILY, MADE OF WAX MATCHES AND SEALING-WAX

The little girl's brother, who also seems afraid of the general, is very easy to make, and a glance at picture 1 shows how to bend the matches. A wooden match, cut in half and pointed at one end, forms the walking-stick.

The heads must be very carefully modelled. Make them as you make the general's, with a little ball of sealing-wax, but in this case, as you have a side view of them, the wax must be pinched with the fingers and nails to make the nose, mouth, and chin. With a little practice this becomes quite easy.

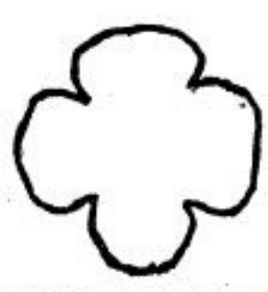
A GYMNASTIC EXERCISE FOR BOYS

We do not need elaborate apparatus in our homes to practise gymnastic exercises. There are many simple exercises that we can perform with no apparatus at all beyond such as is available in every home. For instance, here is something that every boy may practise, and when he has made himself proficient he will have done the muscles of his arms and legs, and also the muscles of his back, much good. Further, he will be able to perform a trick which will be worth while showing to others, and will mystify them not a little. We take in our hands a fairly stout stick, about 18 inches long, as shown in the picture. The stick may be the straight branch of a tree, a round ruler, or any similar piece of wood that is available. Standing in the position shown, with arms rigid and extended, we keep both feet together, and then try to jump over the stick through the loop formed by it and our two arms. Of course we shall probably fail at first, but after a little practice we shall be able to do the feat, and cause no little astonishment to our friends who watch us. The trick is worth learning, if it be only for the benefit it brings as physical exercise. We should begin to practise jumping over the stick in some grassy place or on a mat indoors, where a fall will not hurt us, for, however nimble we may be, we are pretty sure to fall in our first attempts.

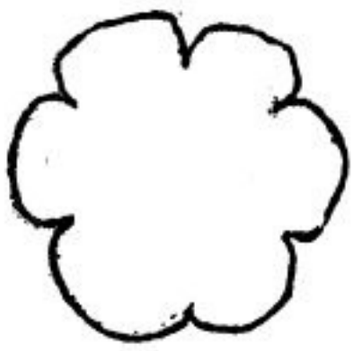
SOME COVERS FOR A GIRL'S ROOM

It freshens up a room amazingly to have some new covers for the table, the dressing-table, and the cushions all made alike, and here is an idea for their decoration which can be extended to fit any number of things—even to curtains or a quilt.

It is just a big, poppy-like blossom shape, cut out of a small piece of linen and sewn on to a larger piece, with uneven stitches in silk, stranded cotton, or wool. It is very simple, but its possibilities are innumerable.



THE OUTLINE

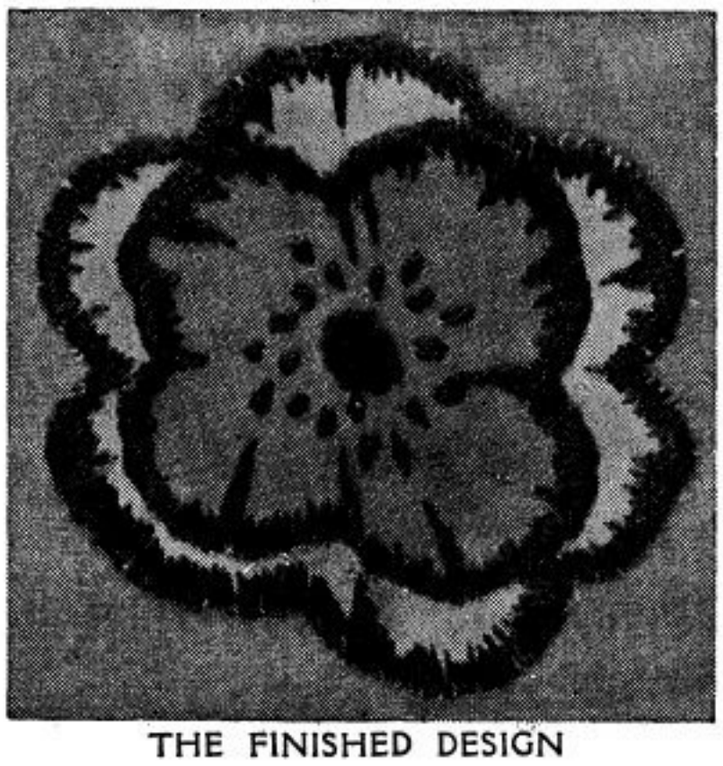


Suppose we choose for our room a nice buttercup-yellow linen. Linen, by the way, is such splendid stuff to use: it washes like new, it is wide, and is made in a number of suitable colours. It also hangs well, and does not look poor and crumpled with use.

Having got a length of linen long enough to make the set of covers we decide upon, we also buy a bit over, and half a yard of the same kind of linen in a paler shade.

We cut out half a dozen of the bigger poppy shapes shown in the picture. They should be at least three inches across. When we copy the pattern, which we shall do in pencil on paper, afterwards using the paper as a pattern, it will not matter if the copy is not absolutely accurate. As long as it is shaped *like* a flower, and pleases us, that will do. We then cut the same number of smaller shapes in the yellow linen. These we are going to lay on top of the paler ones. We tack the under one down first with fine running stitches all round its edges, then arrange the brown one so that the petals set well over the other, and tack that in place. There is quite a lot of care needed in "settling" the top one. Try it in one or two positions first to see which looks best, and do not let them all be exactly alike in arrangement.

After that we take some orange crewel wool and outline the flower. But not a straight outline; we notice in the picture how the stitches vary in length. *The whole effect is arrived at by this variety.* The stitches themselves are the simplest "over and over" sort; they must be worked close together, and we use our sense of beauty to decide how to arrange them.



THE FINISHED DESIGN

The picture helps us to see how they go. Next, we attack the centre, just one big dot, a little larger than the wooden end of our lead pencil, and a group of smaller dots radiating from it. All these we can pencil in for ourselves, and work them over in the simplest stitch we know. We press with an iron on the wrong side, and one flower is finished.

Now about the actual arrangement of the flowers. It will be found best to let them appear as though they had fallen there in

little groups, rather than to space them evenly along. Suppose we are doing a runner for our chest of drawers or even a cushion-cover. In the right-hand corner we might put three flowers close together, and one or two a few inches away, grouped—not in a line. In the other corner we might put a similar arrangement, perhaps using six flowers instead of five, though arranging them practically in the same manner. Occasionally we may let one blossom overlap the other; it will provide variety of spacing in our groups.

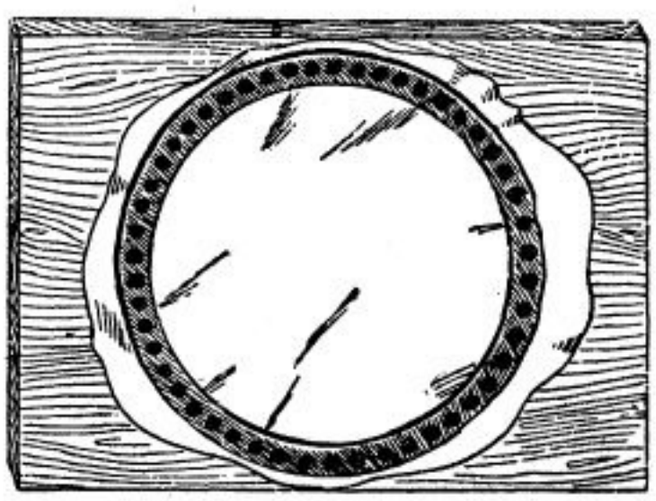
If a dressing-table strip is one of the things we are working, we might arrange the flowers where they show best, and not put them all in the place where the pin-tray usually rests, or the big pincushion stands.

But the delightful part of this arrangement business is that we can cut the flowers all out first, and with a few pins make any number of trial effects.

A TELEPHONE A BOY CAN MAKE

To make a real telephone is a somewhat difficult task, but we can make a good telephone, which will enable us to speak under favourable conditions up to a quarter of a mile away, with very simple materials.

The materials we shall require include two boards about 14 inches long, 10 inches wide, and about half an inch thick. We should be able to get such boards by breaking up an empty box and sawing up two of the boards to these sizes. Then we cut a circular hole about 8 inches across in the middle of each board. We have first to mark the holes to be cut out.

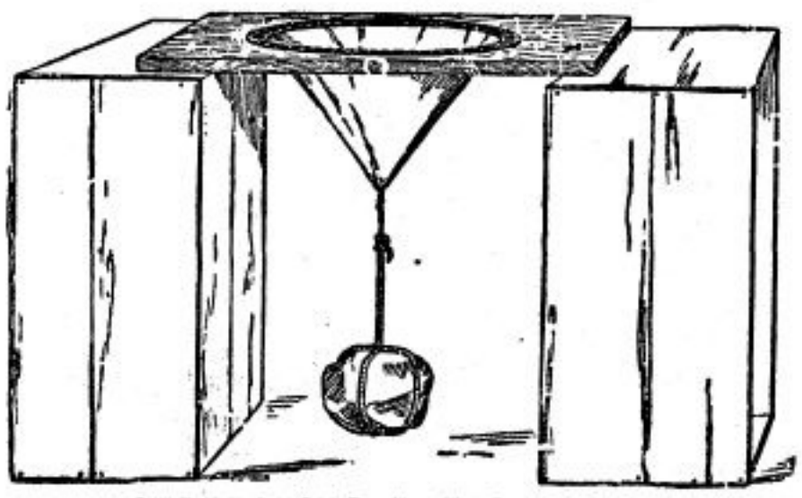


FIXING THE BLADDER

This is easily done by getting a plate about 8 inches across, laying it face downward in the middle of the board, and marking the wood round the edge of the plate with a lead pencil. To cut out the holes properly we should have a keyhole saw or a fret-saw; but if we do not have either of these tools we can make shift by making holes with a gimlet right round the circle we have made. The holes should be as close together as we can get them. Then by using our chisel we can cut out the circular hole. Having done this the boards are ready, and we can put them aside until we have the other parts of our telephone ready.

BUTTON & WIRE

Now we want two fresh beef-bladders. We blow them up hard, tie the necks with string, and put them aside for a few days to stretch. We must not leave them so long that they get dry, however. When they have stretched we cut off the necks and soak the bladders in warm water until they are white and pliable. Then we put them over the holes in the boards we have prepared, putting the outside of the bladders to the wood. They should be put on evenly without creases, and care should be taken not to stretch them in one direction more than in another.



STRETCHING THE BLADDER

Now we take a thin leather band, or some pieces of leather which we can make into a thin leather band, and tack it all round one of the holes above the bladder, as seen in the first picture. This will attach the bladder securely to the board. The tacks should have big heads, and should be driven well home. Old boot-tongues will do nicely for the leather. We cut these up into strips about half an inch wide for the purpose. We fix the two bladders in this way to the two boards in which we have cut the holes. Then the edges of the bladder outside the leather strips should be cut away carefully.

Now take a button and attach a thin wire to it by passing the wire through two of the holes in the button, as seen in the little picture, twisting it so that it will not come out. Make a hole right in the middle of the bladder and put this wire through. Then hang something heavy—a weight of about 7 pounds, or a large stone—to the other end of the wire, as seen in the lower picture, putting the board in some position so that the weight can pull down the bladder. We treat both bladders in this way, and leave them in the sun until they are dry and hard.

All that remains to be done now is to fix up the two boards and bladders at a distance apart, and connect them by fixing a wire to the two wires attached to the buttons. This wire should be fine copper or tinned iron wire. The wires may need to be supported if the distance is great. This can be done by hanging loops of string to the branches of trees, or to any posts that may be in the way. Then we may speak from either end, and the words should be heard distinctly at the other end. We should speak close to the bladder. To "ring up" the other end, we tap the bladder at our end with a pencil.

LITTLE PROBLEMS FOR CLEVER PEOPLE

OUR fathers and mothers have spent many hours—perhaps days—of their lives in puzzling over problems and trying to find out riddles. In this part of our book are some of the things that have puzzled them, with many new puzzles that we can work out for ourselves. There are many puzzles so strange and bewildering that thousands of people have never been able to understand them. Perhaps our fathers and mothers may have been puzzled by these; but here we shall try to make them so clear by pictures and simple answers that we shall all understand. The answers will always be found in the next section of this group.

1. Did George Walk Round the Monkey?

George was trying to tease the monkey which was seated on the top of a barrel-organ. But, although he walked all round the barrel-organ, the monkey always turned so as to face the boy the whole time.

When the boy had walked round the organ, had he walked round the monkey?

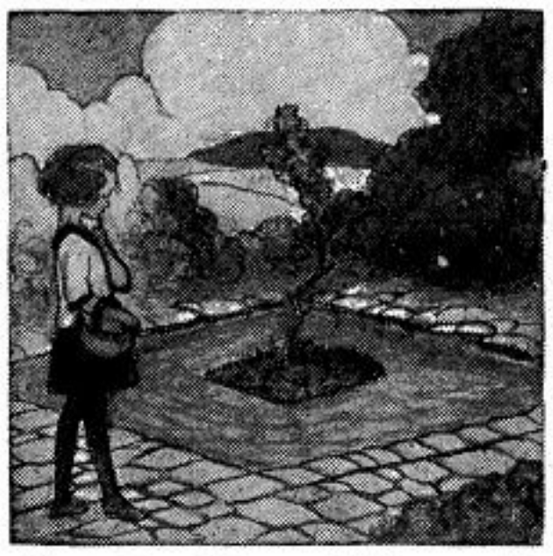
2. How Many Apples Did Mabel Buy?

Mabel bought some pears at three for twopence, and an equal number of halfpenny apples. If she spent sevenpence altogether, how many pears and apples did she buy?

3. How Does Mary Get the Eggs?

Alice and Mary gather the eggs on the farm. One morning Alice discovers that several eggs have been laid on a small square island in the middle of a square pond, and, having no plank long enough to reach across, she allows the eggs to remain where they are.

Mary sees them the next morning, and, looking round for a means to reach the island, finds two planks, neither of which will quite reach from the edge of the pond to the island. But they are her only means of access to the eggs, and, placing them so that she can step across them, Mary reaches the island and takes the eggs home in her basket. How does Mary reach the island with the means at her disposal?



How does Mary get the eggs?

4. Who Is Tom's Uncle's Sister?

"Father, Tom says his uncle's sister is not his aunt." "Well, I expect he is right." If Tom's uncle's sister is not Tom's aunt, who is she?

5. How Many Stamps Had They?

Three children—Jack, Frank, and Harry—divided some postage-stamps among them. Jack had half of them and one more; Frank had one more than half of those left; Harry had the remaining three. How many stamps were there?

6. How Long Was the String?

A boy had two pieces of string, one of which was just twice as long as the other. He cut six inches off each piece, and then found that one was just three times as long as the other. How long were they at first?

7. Whose Portrait is It?

One of the problems that have most puzzled our fathers and mothers is the old problem of a man looking at a portrait, saying: "Brothers and sisters have I none, but this man's father is my father's son." Whose portrait is it?

8. What did the Cork Cost?

A bottle and a cork cost 2½d. If the bottle cost 2d. more than the cork, how much does the cork cost?

9. How Many Girls Are There?

If £3 is divided amongst fifty boys and girls, the boys getting 1s. 3d. each, and the girls 1s. each, how many girls are there?

10. The Missing Canaries

Grandfather gave a children's party at which twenty little guests were present. The old gentleman had prepared a surprise for the children, each of whom was to receive a live canary. But when the time came to present the canaries it was found that many of them had flown. The host sent out for others to replace them, saying to the messenger: "Bring back as many and half as many—that is, one and a half times as many—as there are left in the cage, and two and a half more."

When the messenger came back with these there were enough birds to go round, making twenty in all. How many canaries flew away?

11. How Fast Was the Horse Walking?

I was walking along a country road steadily at the rate of four miles an hour. I saw a horse and cart going in the same direction, and when I saw them they were exactly 220 yards in front of me. After I had been walking for fifteen minutes I overtook them. At what rate was the horse walking?

12. How Much Does a Brick Weigh?

A brick weighs six pounds and half of its own weight. What is the weight of the brick?

13. How Much Are Pegs?

"What are pegs a dozen?" Mary asked the shopman.

"Two more for a shilling," said the man, "would make them a penny per dozen less."

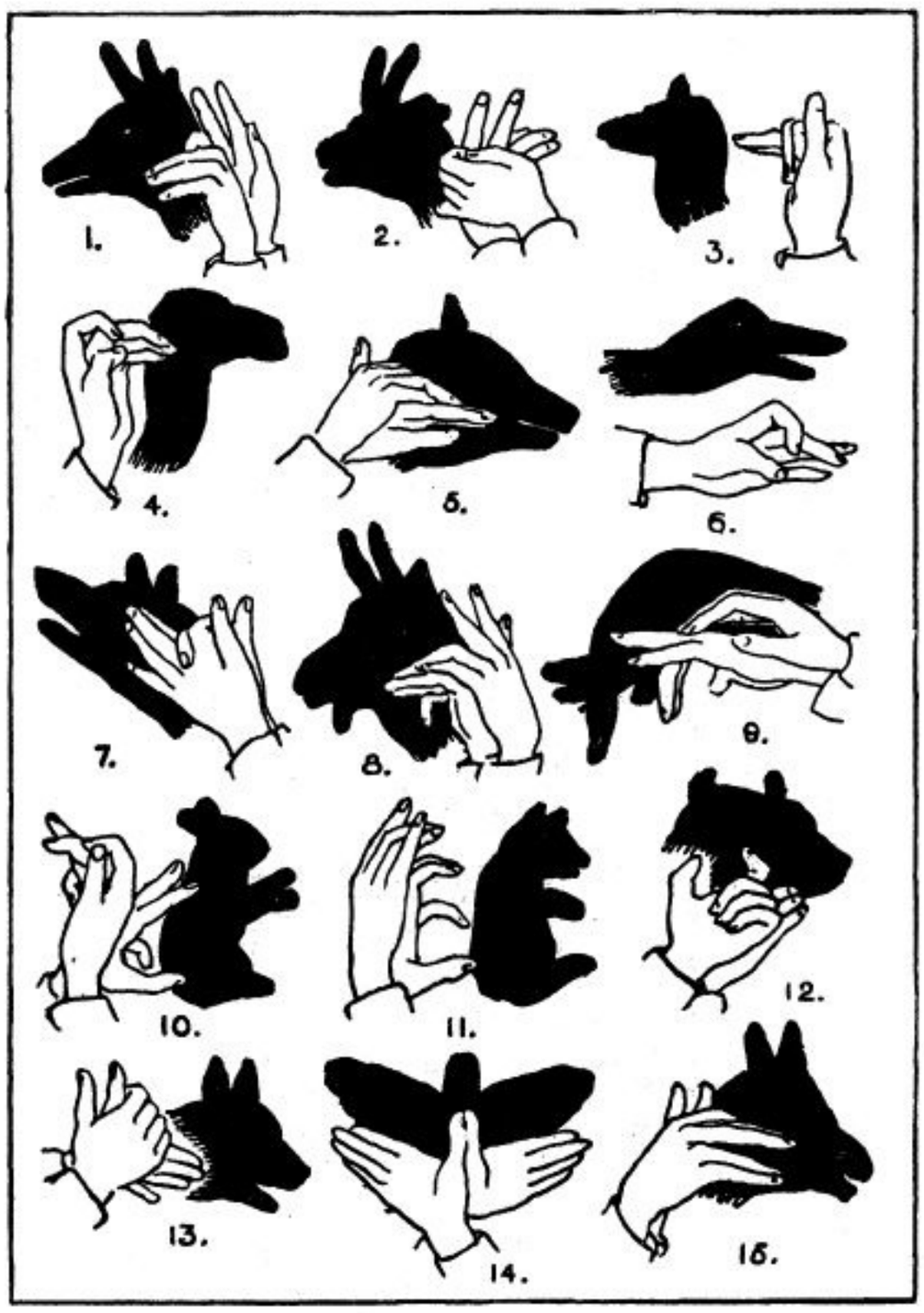
"Then," said Mary, "I will take one shillingsworth." How many did she buy?

THROWING SHADOWS ON THE WALL

THE study of shadows is a very important branch of science. In another part of this book we read about eclipses, and we learn that when an eclipse of the moon takes place what really happens is that the shadow of the earth is cast upon the surface of the moon by the sun, and the shape of this shadow is one of the reasons for believing the earth to be round, or spherical, in shape.

But, in addition to the fact that there is science to be learnt from a study of shadows, it is worth knowing that a great deal of amusement may be obtained by casting shadows upon the wall with no other aid than that of the hands. We need a good light from a lamp or gas or electric light to throw the shadow, and some white or light flat surface upon which the shadow may be cast, but beyond this no apparatus at all is necessary.

Very little is needed in the way of directions. We must, of course, have our hands between the light and the wall or other surface upon which we wish to throw the shadows; and in the pictures on this page we see a number of shadows of animals that any clever boy or girl can make with a little practice. We should imitate closely the position of the hands as shown in each picture until we get the shadow clearly and correctly. Let us repeat all the different forms over and over again, and after a little while we shall remember the position of the hands without having to refer to the picture.



SHADOWS MADE BY THE HANDS ON THE WALL

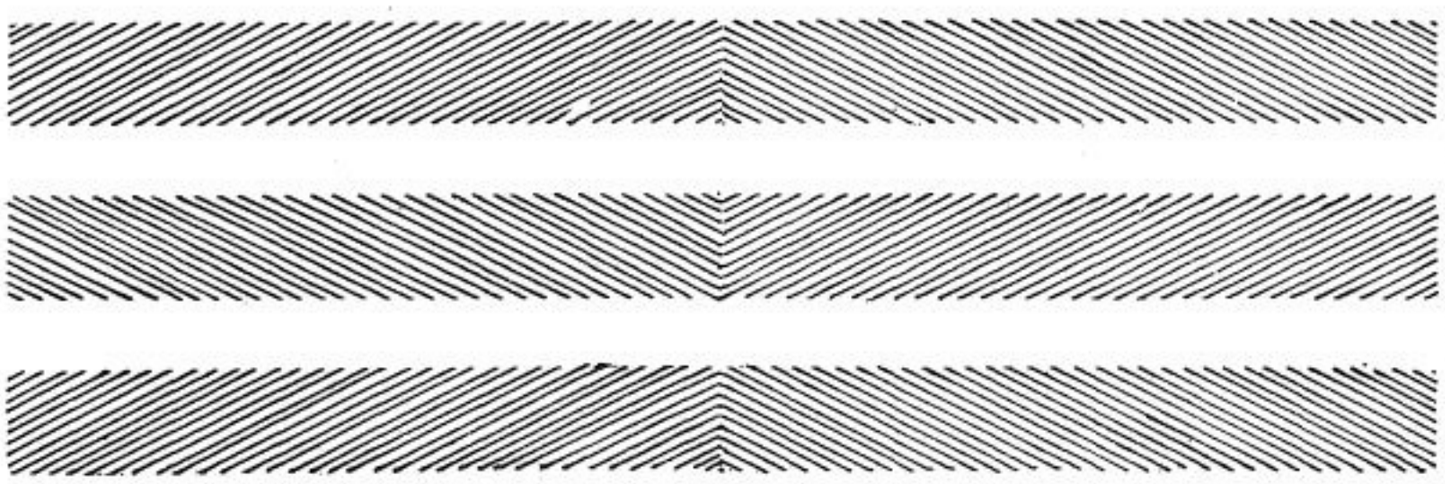
1. Reindeer. 2. Chamois. 3. Llama. 4. Camel. 5. Pig. 6. Goose. 7. Wolf. 8. Goat. 9. Elephant. 10. Hare. 11. Teddy Bear. 12. Ox. 13. Dog. 14. Butterfly. 15. Donkey.

Having learnt to make these various forms, we must next learn to give action to the shadows by moving the fingers or thumbs so that the animals appear to be eating, or moving their ears or legs. Much fun, for instance, can be caused by clever movements of the Teddy Bear shadow. It also adds greatly to the effect if we can imitate the sounds made by the different animals and birds—barking, quacking, grunting, and so on, as the case may be. The shadows shown in the picture are merely a few of hundreds that may be produced by different combinations of the hands and fingers. New forms, or, rather, additional forms, we shall invent as we practise making shadows; and it is remarkable how the same position of the hands, or almost the same position, will give entirely different shadows provided the hands are held at different angles to the light, and a finger or two be moved this way or that, as the case may demand.

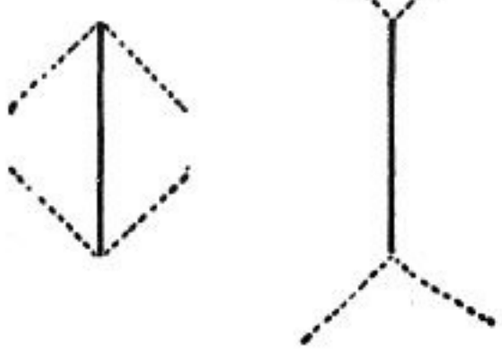
Of course, the brighter the light the blacker will be the shadow, and the outline will be clearer or less defined as we move our hands nearer to the light or to the screen or wall. For all ordinary purposes, and for an entertainment given on the spur of the moment, a light wall or blind is quite suitable, but some who are particularly quick and skilful in inventing and producing shadows may like a special screen upon which to give their entertainments. This may be made quite roughly, of any size, by merely nailing or screwing four battens together to form a square or an oblong, and covering the framework, thus built up, with cheap calico. It would, of course, be quite flat, and would pack away, when not in use, behind a cabinet or chest of drawers. In using a screen, we should allow the audience to look upon one side of it, while we stand on the other side, with the light that is to cast the shadows beyond us. The spectators would see the shadows through the screen—that is, on the side opposite to that upon which we are casting them.

Those who are even more ambitious and have the time to spend in making a more elaborate screen can, if they so desire, improve this by painting upon it curtains, giving it the appearance of a stage. This, of course, adds greatly to the appearance of the shadows from the spectator's point of view.

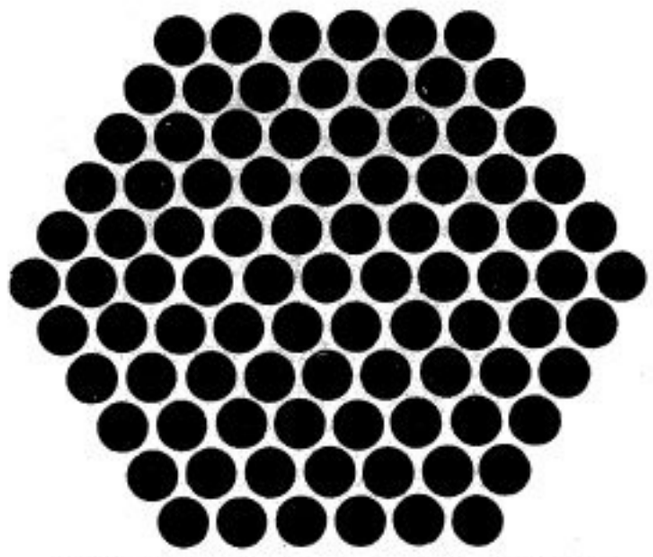
CAN WE ALWAYS BELIEVE OUR OWN EYES?



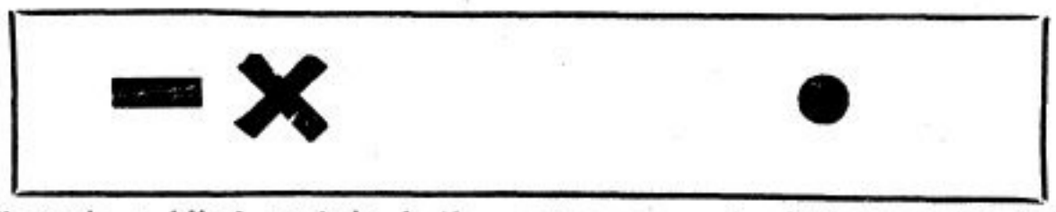
If you fix your eyes on the two white spaces between the lines it will appear as if the top space becomes wider at the ends, and as if the bottom space becomes wider in the middle. But both lines are perfectly straight.



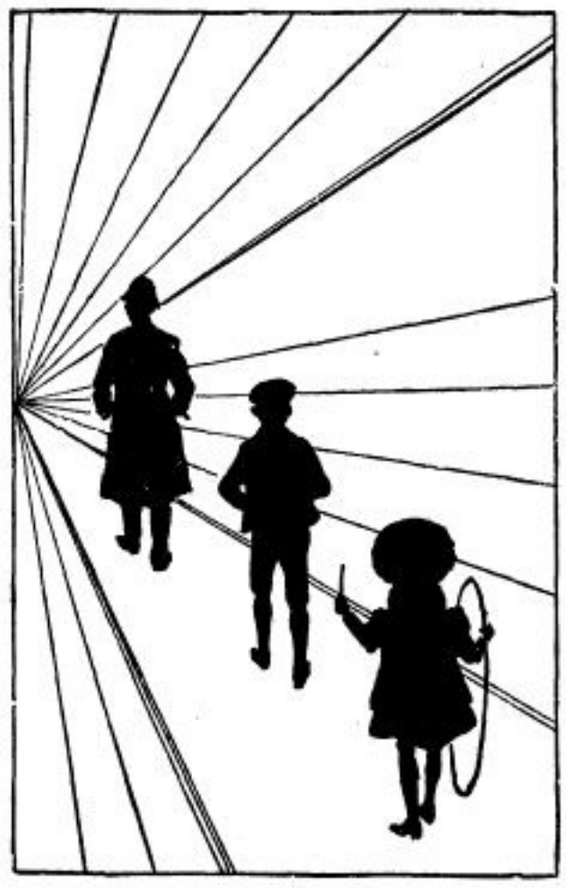
Which line is the longer? The black line on the right appears longer than the line beside it, but both lines are exactly the same length.



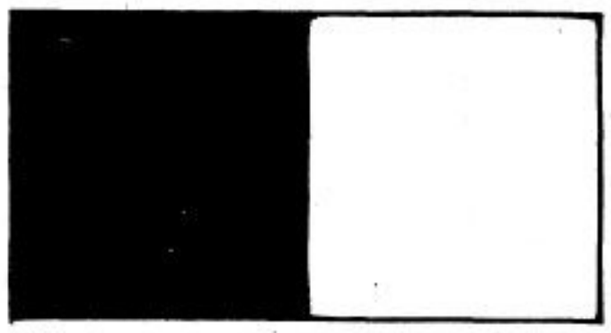
This shows how a circle appears to have sides and corners. These black spots, if looked at intently, seem to have six sides, like a honeycomb, but they are all quite round.



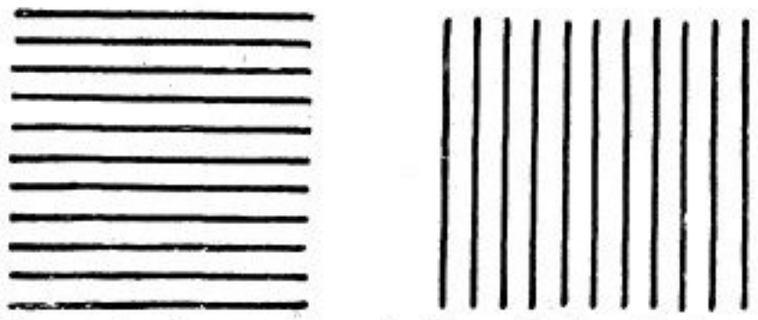
There is a blind spot in both your eyes—part of the eye, that is to say, is blind. You can prove this by closing your left eye and looking at the X with your right. Hold the paper a foot away, and draw it toward you. Though looking at the X, you will see the spot too, but at a certain point the spot will disappear. By drawing it still nearer to you, you will bring the spot into view again.



Who is the biggest? The policeman, most people would say. But the policeman is really the smallest, and the little girl is the biggest. This curious effect was first used by a clever artist for Pears' Soap.



Which square is the larger? Most people would say the white, but the white is smaller than the black.



One of these sets of lines looks higher than it is wide, and the other wider than it is high, but both are square.

Turn the page round and round to the left. The plain rings will appear to revolve rapidly to the left, and the others to go slowly round in the opposite direction.

The poet was perfectly right when he said that things are not always what they seem. We cannot always believe our own eyes. Our vision of things is never quite perfect. There is always a little error in our sight, and this page shows us how we may deceive our eyes and make them believe that things are not what they are.

HOW TO MAKE A LIVING FLAG

A LIVING flag makes a very fine spectacle that is especially appropriate for breaking-up parties and school entertainments, both indoor and outdoor. There is no great expense involved in dresses, and an hour or two spent in drilling will soon make the performers familiar with their places.

An easy flag to represent is the St. George's Cross, and to make it we need thirty-five performers, eleven of whom must be dressed all in red, and the remaining twenty-four must wear white.

If the flag is to be composed of boys and girls, we should select eleven boys to wear red suits. These are best made like a sailor's suit, with wide trousers fitting fairly tightly round the hips, and the usual blouse and collar. A cheap material should be used, such as red Turkey twill, and it will not require very much labour or time to cut out and machine these simple suits together.

The outfits for the girls need not cost anything at all. They may wear ordinary white dresses, white tennis shoes and stockings. All the performers may, if desired, wear caps, or soldier hats, that must correspond with the colour of their dresses. These are easily made out of white or red paper.

To make the flag, we must have seven rows of five performers. Each row should hold hands and stretch out to its fullest length, so that it extends nearly five yards, and all seven rows must stand close together one behind the other. By standing like this we shall get a flag about fifteen feet long by seven feet wide.

The fourth, or middle row out of the seven will, of course, be made up of seven boys dressed all in red; and the third, or middle, performer in each row will also be a boy dressed in red. These boys will make up the red cross of St. George, while the other performers will make up the white ground. The twenty-four girls in white should be divided into two groups of twelve, and stationed one group on each side of the stage or field. As soon as the music strikes up a patriotic air, they must file in and take up their position so that they form four groups of six, with three pairs in each group, all facing the audience. Between each group, space must be left for the boys in red. So that when the girls are in position they form a flag with a blank cross which the boys will occupy.

The boys are divided into two parties, one of six and the other of five, and each party is stationed at the side of the field or stage, like the girls. When the four groups have taken up positions, the boys must march on in correct time, so that the leader of the party of six arrives at the space between the two groups farthest away from the audience just a fraction before the leader of the party of five.

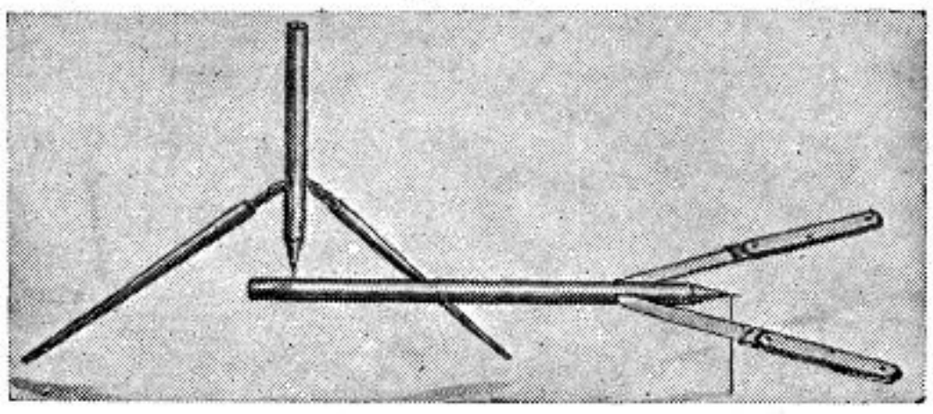
Without stopping, the first of the six leads the way through the passage that has been left between the groups, the first of the five follows, and then the second of the six, and so on alternately. When they reach the front, the first doubles to the right and the second goes to the left, and so on, all except the last three, who remain and take up their places in the front of the central gangway.

Meanwhile, the first boy who marches to the right passes between the two groups on the right and down the central gangway, where he takes up his place in the back row, the first boy round from the left comes next, and so on until the cross is complete. Then, at a given signal, each row joins hands, and the flag of St. George is finished.

If we like we may try to make a more complicated flag, like the Union Jack, but we shall require more performers, and we shall also find that it is a rather more difficult flag to represent, owing to the number of rows in it.

BALANCING PENCILS ON A NEEDLE-POINT

HERE is an excellent balancing feat which any boy or girl can perform with very little practice. The task is to balance a pencil by its point horizontally on the tip of a needle, and then, on the opposite end of the pencil, to balance another pencil by its point perpendicularly.



We need two penknives of almost equal weight, and two penholders also, each of which is the same weight as the other. We begin with the second pencil, sticking the nibs of the penholders into it near the point, so that the holders project at an equal angle on each side. Before preparing the other pencil, see that the balance of this one is correct by standing it on its point upon the finger-tip. If the penholders have been stuck in properly the pencil will stand out upon its point without difficulty.

Now tackle the other pencil. Treat it in exactly the same way as its companion, but using the penknives instead of the penholders. If the knives are stuck in properly there will be no trouble in getting the pencil to balance on the needle's point. We must remember, however, that the other pencil with the penholders is to come on the end, so before these are placed in position the horizontal pencil should tilt up a little at the end farthest from the point.

SCHOOL LESSONS

Simple Learning Made Easy for Very Little People

What We Learn Here

NO book can take the place of school, but here we begin to learn many things which will help us at school and make us useful as we grow up. We shall learn what figures are and the wonderful things that can be done with them. We shall try to draw pictures of the things we see at home and in the streets. We shall learn how to read and write, so that we can read the story-books ourselves and write letters to our friends. We shall begin to understand music, and those who are learning French will find here little picture-stories that will help them with their lessons.

HOW BILLY AND BETTY LEARNED TO READ

BILLY and Betty Bunting are twins. They have a father and mother they love very much, and a baby sister called Baby Bunting.

The twins have lots of toys, and some fine picture books.

They like to look at the pictures, and talk about them, but they always have to ask someone to read the verses and stories to them. So one day they said : Mother, when shall we learn to read for ourselves ?

Well, said their mother, you are five years old ; I think you can begin at once.

Next day Billy and Betty put away their toys and sat down at the big table, and very soon in came Mother with two boxes.

Now, she said, In some of your picture books you have seen big A and B and C. These are called letters, and we are going to learn them, because, if you look at Daddy's newspaper and big books, you will see that they are full of these letters. There are a great many of them, but there is an easy way of learning them. Now let us open our boxes.

In the boxes the children found four rows of wooden blocks, each with a big letter printed on it.

I will put them all in the right order, said Mother, and then I will teach you a little singing way to learn them. I will sing them, and while I sing you must point to each one.

And this is what she sang :

Now lit - tle chil - dren lis - ten un - to me I will teach you A B C
A B C D E F G H I J K L M N
O P Q R S T U V W X Y Z
X Y Z Sugar on your bread, If you don't like it you'll have to go to bed.

READING · WRITING · ARITHMETIC · MUSIC · DRAWING · FRENCH

Then they all sang it together, pointing to the letters all the way.

Now, said Mother, that is all we can do today, because I must go and make some cakes for tea. Don't come into the kitchen, because there is a little surprise for you. But in all our reading we shall learn this way. I will help you a little, and then you can help yourselves.

You can make a good game with your letters by matching them. I have printed them all in the right rows inside the covers of your boxes, so you will know how to place them. Do A to C first. Billy can put out his A, and then Betty can put hers underneath, and so on.

All along the row,
Singing as you go.

So Billy and Betty began their new game of A B C, and they liked it so much that they played it all the morning; and when they went upstairs to have their nap in the afternoon they were still singing—A B C D E F G. They really liked the last bit the best, but Betty said, Don't let us sing that X Y Z bit going up to bed, because it isn't true. We are not going to bed because we don't like sugar on our bread.

And when teatime came, what do you think? Mother had made some little biscuit letters for their tea!

Ho, ho! cried Daddy. You are letting your A B C go the wrong way, aren't you? They are going down. I thought you had to get them up into your heads!

In two or three days Betty came to Mother and said, We can say all the letters' names when they are in a row, but we cannot remember them if they get out of the row, on to the table or on to the floor. Billy dropped one of his, and he thought it was E, but I'm sure it wasn't.

So Mother showed them the way to learn the letters one by one. She said: Let Billy put out his letters in the right way, as it is in your box-covers, but have a little path between the rows big enough for Betty's letters to come along underneath. Pick up one of Betty's letters, begin to sing at A, and push Betty's letter along the path until you come to the one like it, then stop singing. That last one will be the name.

We can make a song out of this:

Push the letters along the row,
Singing, singing as you go.
Stop on the letter that is the same,
And so you learn that letter's name.

So Billy and Betty pushed and pushed single letters along until they knew all their names, even if they did sometimes fall on the floor.

HOW BILLY AND BETTY LEARNED TO WRITE

Not long after the Twins had begun to learn to read, Betty said: Can't we learn to write too? It would be nice to send a letter to Cousin Jim at the farm.

So it would, Betty, said Mother, and it won't be very hard for you because little children do their writing exactly like the printed letters in the books, only bigger, of course, and so, you see, your reading will always help your writing and your writing will help your reading.

Next morning Betty and Billy sat at the big table waiting for Mother, and she brought in two parcels, one large and flat, and the other small and thick. What *could* be in them?

I believe, said Billy, it is another surprise.

In the big flat parcel were two big, black, washable boards, and in the other were two boxes of white chalks and two little sponges.

Daddy and I have bought you these boards, said Mother. Daddy will print your names on them in the corner, and I will find you two dusters, and so you can each have a duster and a sponge.

Oh, yes, said Billy, and we can put the sponges on that blue

saucer which was left when I broke the cup last week.

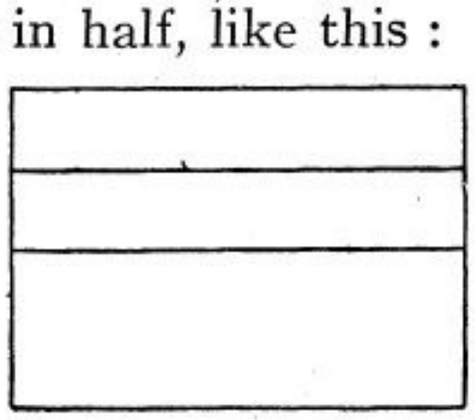
Now, said Mother, you must remember one or two things. First of all, you must sit up very straight, so as not to hurt your back or make it crooked, or hurt your eyes. Don't press too hard, or it will be bad for your fingers.

And break the chalk, said Betty, nodding wisely.

Now, all this time, instead of listening to Mother, Billy had begun to write his A B C, and it was very crooked, the letters tumbling about all over the place.

Oh, dear, said Mother, your letters are all going up and down hill, just like Jack and Jill. That won't do. By and by, if you try very hard, you can write straight without any lines, but I think for print letters we want just one line, so let us find out the best way to draw them.

Lay your board down longways, and then see if you can draw a line cutting it in half, and then cut the top part in half, like this :



We will write on those two lines first, and then cut the bottom part in half last, so as not to rub the last line out with our sleeves.

Why can't we have Daddy's big ruler, Mummy? asked the twins, then the lines would be always straight.

Yes, but it is best to learn to draw them, said Mother.

At first Betty's and Billy's lines were rather crooked, but soon they got them quite straight.

Now let us begin, said Mother. But I don't think we will do our A B C straight through. It is easy to sing and say them that way, but it is easier to write them in little families according to their shape, and I want to show you how you can do some very easy writing and help your reading at the same time. You do want to make very nice letters, don't you ?

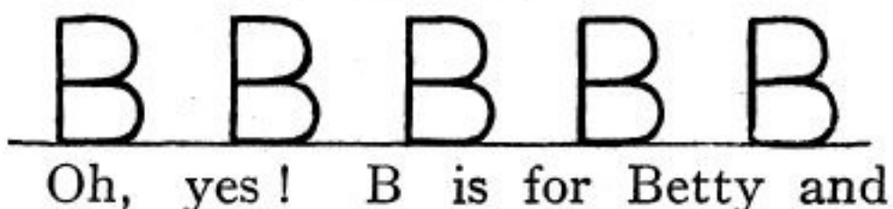
Oh, yes, said Billy and Betty.

Well, you know from those alphabet blocks with the pictures that each letter stands for a sound. Now, 21 of these letters nearly always make the same sound, so it will be fun to write each one of them and find some words which begin with that sound. That will turn our writing lesson into a guessing game, as you will see.

We shall miss out A until by and by. We are going to make first SOME LITTLE BUN LETTERS.

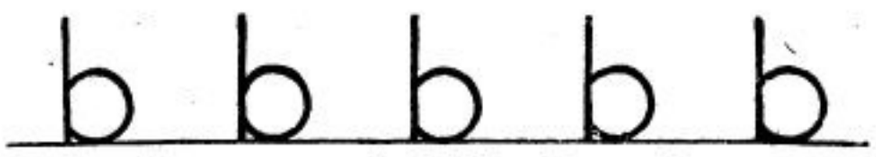
The twins liked that.

Let us start with capital B. We make it like this. One tall upright stroke standing on our line—lots of our letters will start with a tall line—and then two little buns :



Oh, yes ! B is for Betty and Billy, cried the twins, and we have a bun each !

Yes, said Mother, and we will make little b's for buns, and they must be the same size :



B for Betty and Billy Bunting,
B for our laughing Baby Bunting.
b for bun and box and bed,
b for butter and b for bread.

Now let us do another bun letter. Capital D and small d.

The big D's bun goes on in front,
Little d's bun is behind.

D for Dolly and D for Dad,
d for dinner and the dumpling we had

HOW BILLY AND BETTY LEARNED TO COUNT

About the same time that Billy and Betty were learning to read and to write Mother said she thought that it would be nice for them to learn to count ; it would be a new kind of lesson.

Of course, little children are always learning to count things. Doesn't every little child know which is more, 2 or 1, if anybody asks them which they would like best, 2 cakes or 1 cake ? Of course they do. But still there are many things to learn about numbers, and it makes children think, so now we will begin.

Billy and Betty knew a lot of pretty little nursery rhymes, and one of those they liked best was :

1 2 3 4 5
Once I caught a fish alive,
6 7 8 9 10
Then I let it go again.
Why did you let it go ?
Because it bit my finger so.
Which finger did it bite ?
This little finger on the right.
Oh ! Oh ! Oh !

They used to sing it sometimes going up and down stairs and on their fingers. Fingers are so handy for counting, but Mother said to the twins one day : You must not get too fond of counting on your fingers, or you won't be able to count without them when the time comes to count in your head, which is the best place to count !

That is what the shopman does when he is counting up the change for us. His master would not like to see him using his fingers, would he ? And quite a lot of counting can't be done on one's fingers, so we won't use them at all if we can help it.

First of all, said Mother, I think we will learn how to write down 1, 2, 3, 4, 5, because while we are learning all about our numbers we shall often want to write them down on paper.

We can learn them just as we did our A B C. Match them first all in rows, and then learn which is which. See, here are two long brown boxes that Daddy's spectacles came in the other day. Let us see what is in them now.

When they opened them they found one long card with figures on it,

1 2 3 4 5

and a lot of little loose ones, so they matched up all the loose ones under the row on the card.

Billy began to put out all his 1's one under the other :

1
1
1

But Mother said, Don't do it that way, Billy, because you can't sing down ; but you can sing 1, 2, 3, 4, 5 across, and that is the way to learn them.

So they matched up their rows and then tried to find out all the names one by one, as they did with the letters.

Push a figure along the row,
Singing, singing as you go.
Stop on the figure that is the same,
And so you find that figure's name.

It is like this :

1 2 3 4 5 4

So they pushed along each figure until they knew every name; and then in the same way they did :

6 7 8 9 10

Of course Betty and Billy wanted to know why there were two numbers to make 10, so Mother said, I will tell you all about that by and by; but first we must have a little chat about that round one 0 at the end of 10. It really ought to come at the beginning of our line, as I will explain, only if it did it would spoil our pretty song.

MUSIC—THE WONDERFUL LAND OF SOUND

I WANT to take you to the wonderful land of Sound, a country so beautiful that we will call it our Magic Kingdom.

In this Kingdom there are Fairies who will sing to us, and when we know them and can understand their language, they will tell us stories of the winds, they will bring to us the songs of the birds, the murmur of the brook, and all the beautiful sounds in the world.

In this wonderful Fairyland, also, we shall find little black Goblins; but they are good-hearted Goblins, as kind as they are black; for in this beautiful land Fairies and Goblins help one another, and join together to tell us the most delightful stories.

We have all seen this Magic Kingdom, which is in nearly all our homes. We call it the *Piano*. Whenever I am there I am so happy that it makes me want to show you the way, and help you to understand all the beautiful things that the Fairies whispered in the days of long ago.

Let us open the door of this Fairyland. Inside we see what looks like a long black line and a long white line. If we look closely, we see that these lines are really made up of about fifty little white pieces and not quite so many little black pieces. The fifty little white pieces are where the Fairies dwell; the black pieces are the homes of the Goblins. The Fairies live in the white houses and the Goblins in the black ones.

The Fairies are very simple little people, and like to make it quite easy for us to talk to them, so they have very short names which all of us will find easy to remember. There are only seven of them, so they have taken the names of the first seven letters of the alphabet. Let us say to ourselves, "Seven little Fairies, seven little names."

A B C D E F G

FAIRY A FAIRY B FAIRY C
FAIRY D FAIRY E FAIRY F
FAIRY G

We will not talk about the Goblins' names today, but there is something important that we must notice particularly. The homes of the Goblins—the thirty-five little black houses—are arranged in twos and threes, and this arrangement is a great help in finding out and remembering the homes of the Fairies.

In nearly all pianos Fairy A has eight houses. They all look exactly alike, and all are named A, after Fairy A herself.

We must find out where Fairy A lives, and must first of all notice the group of three black houses. Look carefully at these three Goblins' homes, and then remember that Fairy A lives on the *right side of the middle black house.*

Fairy B is satisfied with seven homes, all exactly alike, and each one is named after herself, B. Again we must notice the three little black houses, because Fairy B is always found on the *right side of the third little black house.*

Fairy C has seven houses, all named C, after herself, and they are on the *left side of the two little black houses* that are grouped together.

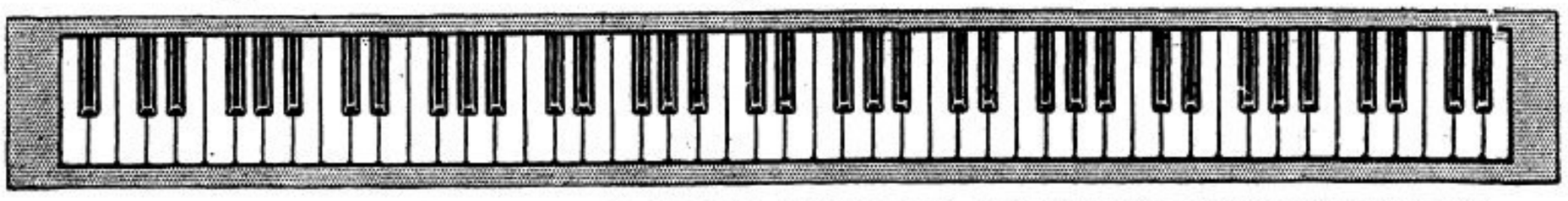
Fairies D, E, F, G have also seven homes each, and each of these little houses bears the name of the Fairy to whom it belongs. Let us see where they live.

Look again at the little group of two Goblins' houses. The little Fairy living *between these two black houses* is Fairy D, and wherever we see just two Goblins together we can be quite sure that Fairy D is to be found between them.

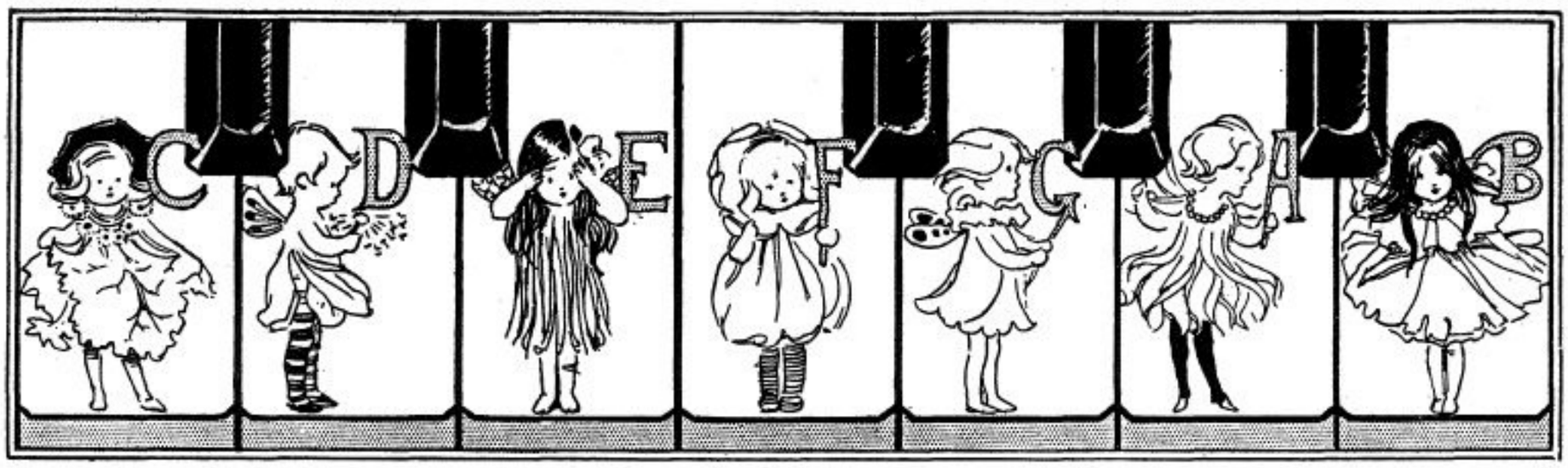
Fairy E feels that she wants to be one of this happy party, and she has her home next to D, so that Fairy E is on the *right side of the second black house.*

Fairy F and Fairy G like a group of three Goblins, so Fairy F lives on the *left of the first of the three black houses,* while Fairy G lives next door to her, on the *left side of the middle black house.*

Now we have found out where all the little Fairies live. Let us look at the pictures very carefully, and then go to the Piano and see if we can find the little houses all ready and waiting for us there.



THE ROW OF BLACK AND WHITE HOUSES IN WHICH THE FAIRIES AND GOBLINS LIVE



THE SEVEN LITTLE FAIRIES, ALL IN THEIR HOMES

Every day we will enjoy a real game of play with the Fairies and Goblins in the Magic Kingdom. We can think we are the postmen of Fairyland, and each morning we must take the Fairies their letters, being sure to go to the right houses, and careful not to forget any of our little friends.

DRAWING—HOW TO MAKE YOUR FIRST PICTURE

WOULD you like to learn how to draw, and to be able to make pictures of the things you see?

It is really easier to learn to draw than to learn to write, though it is not easy at first to draw things like houses, or horses, or cows. Yet all the lovely pictures that hang on the walls are drawn by people who once found it difficult to hold a pencil or a chalk.

Some day, perhaps, you will be able to make beautiful pictures too. Would you like to begin today and see what you can do?

You must get two large pieces of paper, one brown and the other white. Ordinary brown parcel paper will do quite well; the best white paper for you at present is called cartridge paper. Then you must get some white and some coloured chalks. If you have a paint-box, you must learn to use it. It should be the kind of box that has moist colours in pans or in tubes. You must have a jar of clean water ready, and your paint-box must be quite clean, too. No one can paint well with dirty colours or brushes.

If you can find a drawing-board and four drawing-pins, you can fasten your sheet of brown paper to the board at each corner; but if you have not a board you should use a big book with a smooth cover. Put a box or another book under the end of the board; this makes the paper slant a little, and saves you from having to stoop. It is bad for the eyes and back to stoop over your work.

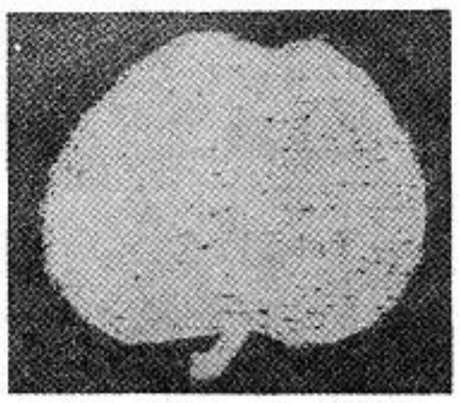
When everything is ready, choose something easy to draw. Suppose you get an orange, or an apple, or an egg, and put it a little way in front of you on the table. Then take a thick piece of white chalk. It is very difficult to hold it properly at first, especially if you have learnt how to write, because the right way to hold a chalk is quite different from the way in which we hold our pens. The fingers must not be close to the point of the chalk, but half-way down, as we see in the picture. Don't hold your chalk too tightly, and if your fingers feel stiff, and ache at first, do not mind that, but try very hard to hold it right—it is very, very important.

When you can manage to hold the chalk in the proper way you can begin to copy what you have chosen. Do not make a thin line with the point, but let the side of the chalk touch the paper, and rub it round and round till you get something like the shape you are copying.

HOW TO HOLD THE CHALK

Take care that it is not too small; all drawings must be big. It is much better that they should be too big than too little. If you hold the chalk in the right way it will be easier to rub it round and round, and it will not take so long to get the right size as it would if you held your fingers close up to the point. The picture shows the way to begin. If your first drawing does not look good, do not

try to rub it out, but make it over and over again till you get it right. If you are drawing an orange, make it a little flat at the top and the bottom. An egg is rather long, and thicker at one end than at the other. Apples are all sorts of funny shapes, not any of them quite round, and you can often see the stalks.



THE APPLE IN CHALK

When you have made a good picture you can put the brown paper away, and choose a white piece. If you are drawing an orange, try to find a piece of coloured chalk exactly the right shade of yellow, and draw with it on the white paper, beginning in exactly the same way as you did before. See that you are holding the chalk properly. An apple must have green and red chalk too, if it has a rosy cheek. You cannot draw a white egg with white chalk on white paper, because it would not show, but some eggs look brown or pink, and you can draw these if you can find chalks to match the colour.

If you want to use your paint-box, remember it must be quite clean before you begin. Take a rather thick brush. Some brushes are good and some are bad. The best brush to use at present is the one having No. 6 on the handle. If it has any loose hairs, or if some of them are longer than others, it is a bad brush, and should not be used; these hairs will make lines where you do not want them. A good brush will have the hairs so arranged that you will be able to draw them all smoothly together to a point after you have dipped it in the water.

If your paint-box has hard cakes of paint, you must first put a little water in a clean saucer and rub the hard cake well in it until you have enough colour mixed. If your box has moist colours in pans, you must first dip the brush in water and next in the colour, and you should then put as much colour as you want to use in the tin lid of the box. Tube colours must be used carefully, and the tube should be squeezed very gently at the bottom. Put out only a little colour, and always put on the little cap again when you have squeezed any colour out.

For the apple you must mix blue and yellow together. There are different blues and yellows in your box, and you must try which will make the green most like the colour you want.

If the apple has a red cheek choose the proper red, and mix both colours—the green and the red—ready in separate parts of your paint-box or saucer. The orange must have bright yellow, and if the yellow in your box is too pale, mix a little red with it till it is the right shade. For the pink or brownish egg you must take a little brown or red paint, made pale with water. Never use Chinese white or any white paint when you are painting on white paper. If your paint is too dry it will make your work look smeary, and if there is too much water in it it will run all down the paper.

Hold your brush rather low down, and try to paint from one copy. Do not make any lines with your brush, but begin in the same way as you began with your chalk. Paint as smoothly as you can, and do not go over the same place twice, or go up and down with your brush.

It is rather difficult at first to paint anything that has two colours, like the rosy apple. I will tell you how to do it, and you can try, but do not be surprised if it does not look right the first time.

Put the green paint all over in the shape of the apple first, and wait a little while. Then take some bright red paint, with only a very little water in it, on the point of a clean brush. Before the green paint on your apple is quite dry, touch it with the point of this brush in the place where the rosy cheek is. The red paint will run into the green and look very nice, if you have done it carefully.

HOW TO BEGIN THE APPLE

If you have found all these things easy to do, you may try to make a dish of fruit, or to draw an egg in an egg-cup; but it is much better to do a little at a time and a little every day. It is a very good plan to see if you can remember what you have drawn, and to do it over again without looking at the thing itself.

FRENCH—A LITTLE PICTURE LESSON

YOU will not be able to learn to speak French from these lessons. There are some sounds in French which cannot be made clear on paper, and you will only be able to understand these by hearing them spoken. But this page will help if you are learning French at school, or if there is someone at home who can help you to understand how the words should be said. These lessons tell us the story of a visit to France and of the visitors' doings among the French people. The first line in each case is in French; the second line gives the English word for the French word above it. But the French people do not put their words together as we do, and the third line shows how we make up the words into English.

Pierre—Peter

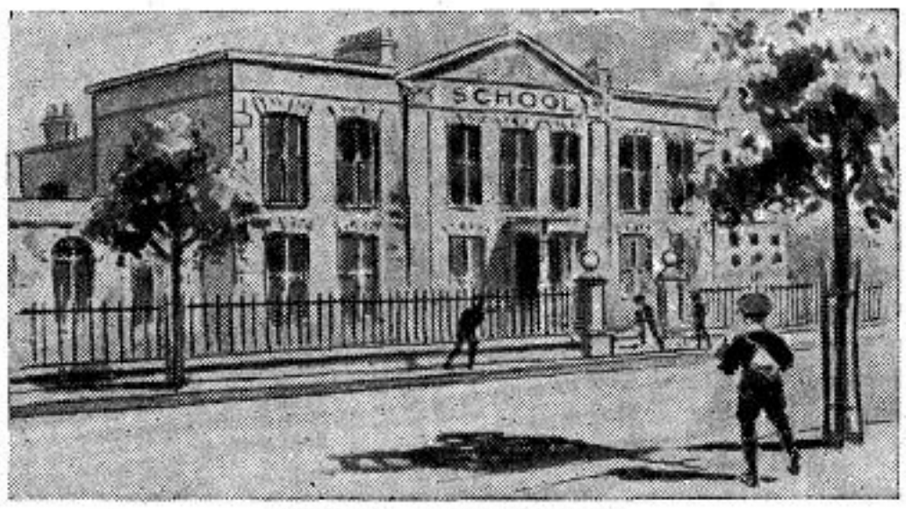
Jeannette—Jenny

Je m'appelle Pierre, et j'ai dix ans
I myself call Peter, and I have ten years
My name is Peter and I am ten years old

Ma sœur Jeannette a huit ans
My sister Jenny has eight years
My sister Jenny is eight years old

Mon petit frère a deux ans
My little brother has two years
My little brother is two years old

On l'appelle Bébé
One him calls Baby
He is called Baby



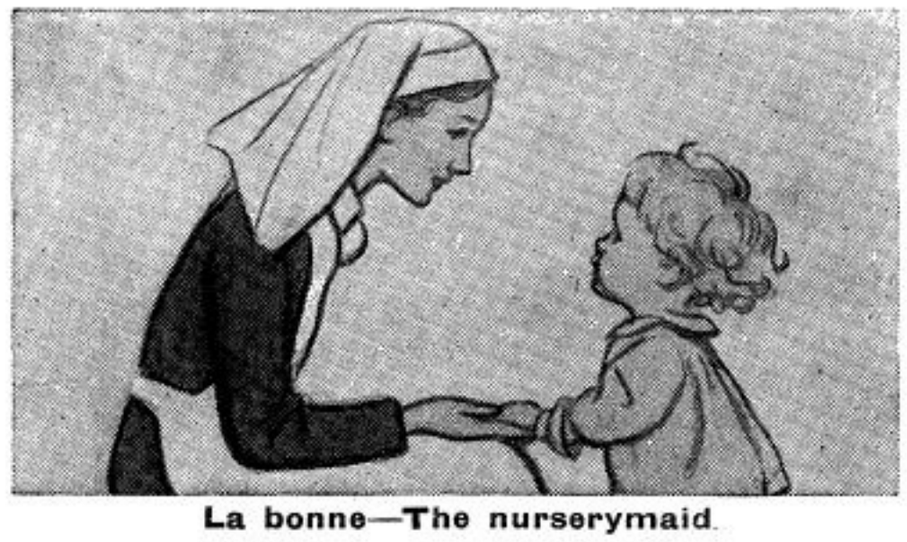
L'école—The school

Jeannette et moi nous allons à l'école
Jenny and I we go to the school
Jenny and I go to school

Maintenant nous sommes en vacances
Now we are in holidays
Now we have a holiday

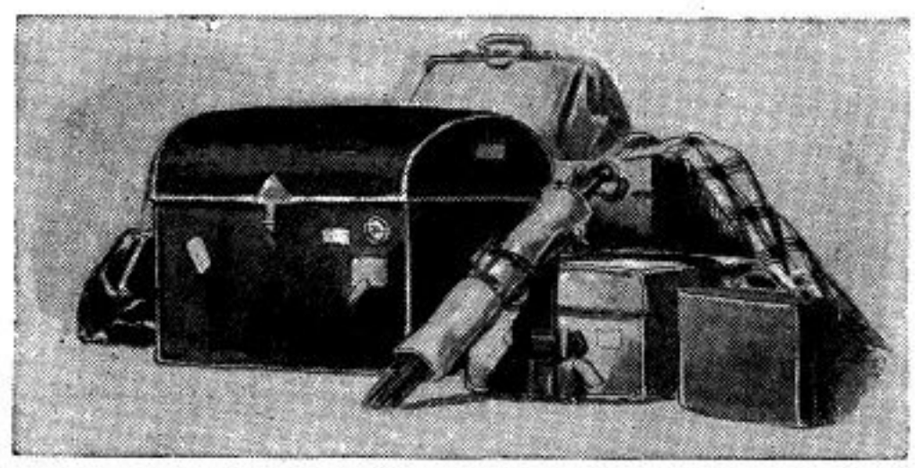
Nous allons en France
We are going in France
We are going to France

Nous allons avec papa et maman
We are going with papa and mamma
We are going with papa and mamma



La bonne—The nurserymaid

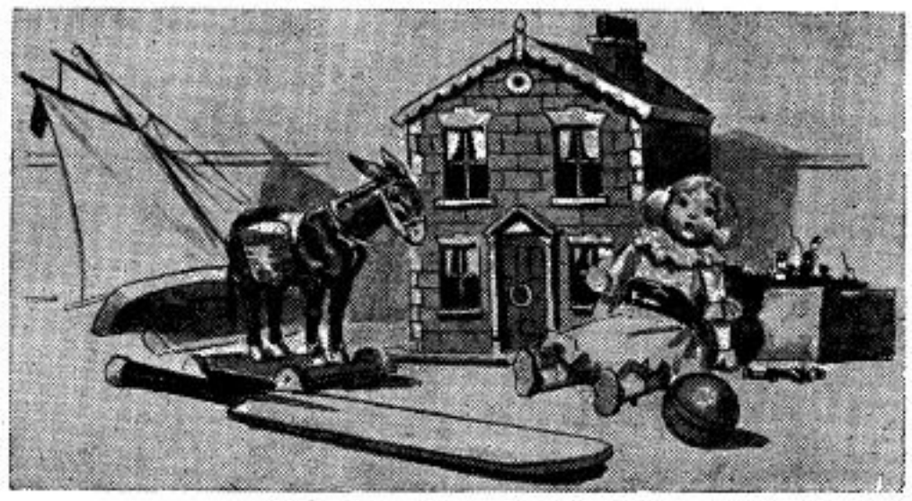
Bébé va venir et la bonne aussi
Baby is going to come and the nurse also
Babv is coming and nurse also



Nos malles—Our trunks

Notre bonne a fait toutes nos malles
Our nurse has made all our trunks
Our nurse has packed all our trunks

Nos jouets sont dans la grande malle
Our toys are in the large trunk
Our toys are in the large trunk



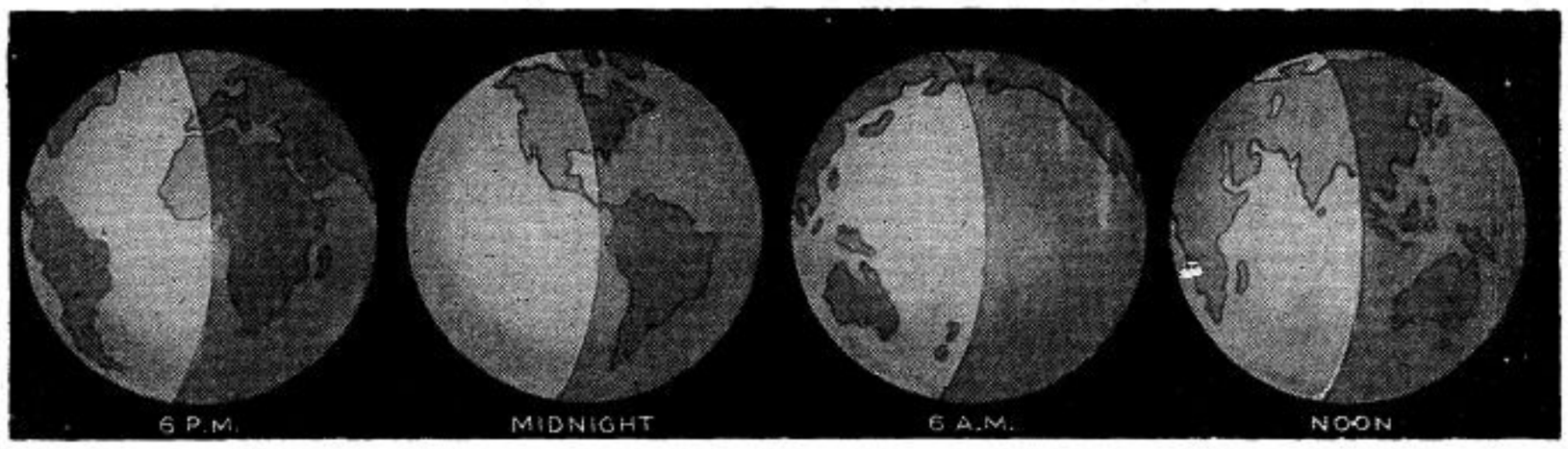
Nos jouets—Our toys

Nous avons beaucoup de jouets
We have many of toys
We have many toys

Bébé emporte son bateau à voiles
Baby is taking his boat with sails
Baby is taking his sailing boat

THE DAYS WHEN EARTH ROLLED THROUGH SPACE AS A RED-HOT GLOBE

Here our scientific artist, Mr Morrell, gives us a conception of what the Earth was probably like in the days when the globe was red-hot, flaming out for thousands of miles into space, with showers of fiery rain pouring over it. Nobody knows how long that was ago: it may have been a thousand million years.



The Changing Face of the Earth to the Sun every six hours

HOW THE EARTH WAS MADE

AND now we must ask ourselves more particularly the great question: Where have the Sun and the Earth come from, and what were they like at first?

For a long time men used to think that the solar system, including the Sun and the Earth, had been from the first as they are now. No one now thinks that. We believe that they have grown, so to speak, to be what they are, and we have a fairly good idea of the way they came. In order to see what the solar system was like at first we have only to take a telescope and look up at the sky, and there we shall see scores of thousands of wonderful bodies which are still at the stage reached by the solar system long ages ago. These bodies are called nebulae, and one of them would be called a *nebula*, which is the Latin word for a cloud. They look like little bright fleecy clouds in the sky. Some of them can be seen with the naked eye, and then they look like stars, but they are quite different from stars.

By examining the kind of light they send to us, we know that the sky contains, at the very least, 120,000 real nebulae. They are not star-clusters at all, but glowing clouds of matter. Perhaps we can get the best idea of what a nebula is like by using the name the poets often call it by—*fire-mist*.

A nebula is like a great mist of fire. Those we see in the heavens are of different shapes and sizes. Many of them are far bigger, hundreds of thousands of times bigger, than the whole space occupied by the solar system. A great many of them have a shape like the firework called St. Catherine's wheel—flattened and coiled up. They are called spiral nebulae. You know what a spiral staircase is. The spiral nebulae, however, ought never to have had that name, because they are not at all like a spiral staircase; they are flat and thin, more like a St. Catherine's wheel in shape.

If we look at some of these spiral nebulae we see bright points in them here and there which suggest to us that the fire-mist has become thicker at certain places than at others. Often these bright points are so large and bright that they look like stars, and, indeed, probably they are stars. Probably all stars are made out of nebulae. Now let us come back to our solar system.

If you could look at the solar system from a great distance away you would notice many remarkable facts about it. In the first place, you would notice that all the twistings and movements are in one direction; then you would notice that the solar system is a flat thing. All the planets, so to speak, go round the Sun at much the same level.

There is another curious fact, and that is that the kind of stuff the Sun is made of is the same stuff that the various planets are made of. It almost looks—does it not?—as if our little Earth and all the planets were once a part of the Sun.

And so men guessed that perhaps the pieces of stuff that now make the planets

had been somehow brushed off from the Sun, and that as they cooled down they had become solid and started travelling round and round him. We are sure now that that is not what happened, but we are also sure that the idea was right. The Sun and all his planets were once one.

Indeed, we believe that in its first stage the solar system was nothing else than a nebula, like one of the very smallest of the thousands in the sky. We are not certain how such a nebula would gradually become changed into the solar system that we know. It seems to be certain, however, that a nebula is apt to become flattened and to take on the shape of a St. Catherine's wheel. Far too many of the nebulae are of that shape for us to imagine that there is not some good reason why they should be so, and we have little doubt that if we could live long enough to watch the nebulae that are not spiral we should see them gradually become so.

Now, there is one great force that must always be at work in a nebula like this. It is a force which acts everywhere; and though it has rather a long name, it is not difficult to describe. We are certain that in the course of time this force must work great changes in a nebula—such changes as we believe to have been worked in the nebula from which the present solar system was formed.

WHAT SIR ISAAC NEWTON THOUGHT AS HE LAY UNDER AN APPLE TREE

This force is called gravitation, and it acts in such a way that it causes every tiny piece of matter in the world to be attracted by all other matter in the world.

Gravitation is, perhaps, the most familiar of all facts in our daily lives. When you let a ball out of your hand it drops to the earth simply because the earth and the ball have attracted each other.

One of the greatest men who ever lived, an Englishman called Isaac Newton, was lying on his back, under the shade of an apple-tree in his mother's garden. He was not just dreaming his time away, however, but thinking; and he saw what thousands of people had seen before him, but never troubled to think about—an apple falling from the tree to the ground. The result of his thinking about this was that he discovered a law of attraction which is true throughout the whole universe, not only of the Earth and a ball, but also of the Earth and the Moon, the Earth and the Sun, and also of all the little pieces of matter in a nebula.

From the first moment a nebula was formed, then—perhaps by a collision between two stars or more—there would begin to act upon all its parts the same force of gravitation which acts upon you if you miss your footing and tumble downstairs—a force that goes on acting all the time, never ceasing and never getting tired. So, some years after the great work of Newton, several men began to apply his ideas to the nebulae (remember that when the word is spelt like this it means more than one nebula) and to ask what must happen in the course of ages when this force of attraction acts upon a nebula.

THE HEAVENS LIKE A RICH GARDEN FILLED WITH BLOSSOMING WORLDS

One of the greatest of these followers of Newton was Herschel, who made finer telescopes than anyone had used before, and who spent all his life studying the stars and the nebulae. He was the first man who ever made a list of nebulae, and he it was who first saw that they might be arranged in classes, from those which look like little milky clouds, and nothing more, to those which are really stars with a sort of cloudy substance round them.

So it seemed to him that some " clustering power " must be at work turning these scattered and milky nebulae into brighter and smaller objects which would some day become stars or suns and solar systems, and he compared the heavens to a rich garden containing plants in all stages of their lives. This gives us the advantage, he says, that as at one and the same time we can see all the different stages in the history of plants—from their birth to their death—so also in the heavens we can see all the different stages from a nebula to a star. Then there followed a great Frenchman who saw that the " clustering power " must be gravitation, and who worked out exactly what must happen in such a case, as we know exactly the force with which gravitation acts.

THE SPACE THAT SWARMS WITH WORLDS LIKE PEBBLES

Now, in order to fill in the history of the solar system we have to reckon with two facts. We have already seen that the Sun and his family do not stand still in space, but are moving all together through it. We cannot, indeed, believe that there is rest anywhere; everything is moving.

But for a long time this movement of the nebula from which the solar system was formed did not seem to be important; at any rate, there seemed no reason why it should help us to understand how the solar system was formed. But now we are inclined to believe that the movement of the nebula had a good deal to do with the formation of the solar system.

Men used to think that space outside it was quite empty as far as the nearest of the fixed stars, but we are now learning that space is very far from empty, and that really it is swarming with those little bodies like grains of sand or pebbles, or even larger bodies still, which we have already described as being found within the solar system. It is quite reasonable to suppose, then, that as the nebula went through space, gradually becoming smaller and denser by the force of gravitation causing it to shrink, it would come across millions and millions of these grains and pebbles, also rapidly moving.

THE EARTH OF LONG AGO THAT WAS LIKE THE SUN TODAY

Many interesting consequences would follow. If the nebula ran across a great swarm of meteorites, as the Earth does in November, then there might be the beginnings of a planet. But, even apart from such a swarm, there would be marked results from the millions of little collisions that would be constantly happening. For one thing, the nebula would be made hotter, for when anything in moving strikes anything else, or is partly stopped by it, its motion is turned into heat, which is itself a kind of motion. We use this fact every time we strike a match. We put the match in motion and then partly arrest the motion by whatever we rub it against; so there is enough heat produced to set the match on fire.

That, then, is all that we can tell at present about the origin of the Sun and his family. Everyone is agreed that something like this is what really happened.

Now let us try to imagine what our own Earth must have been like in its beginnings. We cannot be quite certain as to the shape of the Earth at first, though some men who have made a careful study of the subject think it may have been shaped like a pear instead of like a flattened orange, as now. But, whatever its exact shape was, it was so utterly different from the Earth we know that we can scarcely imagine it. Really, the Earth of long ago must have been far more like what the Sun is now—only, of course, quite tiny compared with the Sun.

We think of the Earth as something that ends suddenly at the surface—at the level of the ground. That is, however, by no means quite correct. Even now the Earth does not end sharply all round as an orange does. We must not imagine that the Earth ends at the level of the ground or at the level of the water, and that we walk outside it.

THE SOLID EARTH THAT THINS OUT UNTIL IT IS A GAS

Not at all. Above both the ground and the water there is something which is really part of the Earth, though we cannot see it. It moves with the Earth round the Sun, and twists round with the Earth as it spins. The stuff of which it is made is constantly being exchanged in both directions with the water of the sea and the stuff of which the dry ground is made. In short, the air is part of the Earth. The air as it is at present probably extends upwards from the surface of the solid and liquid part of the Earth to a distance of about a hundred miles. As we pass upwards through the air in an aeroplane we find the air becoming more and more thin, or more and more *rare;* and though we cannot go very far, we are quite sure this rareness goes on increasing until there is no air to be found.

So even now, we see, the Earth does not really stop short sharply anywhere, but its stuff is spread out all round it in a layer of gas which gradually becomes rarer and rarer until it stops altogether.

THE ATOMS IN THE GREAT GLOBE OF GLOWING GAS

What we now call the Earth was at first nothing more nor less than a great globe of glowing gas. In that hot, twisting, glowing globe there were contained all the tiny little portions of matter, or atoms, which now make up the water of the sea, the soil, the rocks, the bodies even of all living things, and also, of course, the air, or mixture of gases, that still remains covering the Earth like a warm blanket.

So far are we from being really on the surface of the Earth that the whole world, sea and land together, is really covered with a great sea or ocean of air. We crawl about at the bottom of this ocean, and one of the latest things that men have

learnt to do is to jump off the bottom and swim in it, as birds have been able to do for ages without troubling their heads at all ; only we call this swimming *flying !*

In the course of time we know that great changes had to happen in this glowing globe of gas. It was doubtless then giving out light and heat like a little sun, and in doing so it would gradually become cooler. If you make a poker red-hot, and then take it out of the fire, it will give out light and heat for some time ; then it will give out heat only, but no light—it is still hot, but will have become dark ; and it will become quite cold. It cannot give out light and heat without becoming cooler, for it does not make them out of nothing. The case was the same with the Earth, and in the course of long ages she had gradually to become cooler. At last she had to become so cool that part of the stuff of which she was made would no longer remain a gas, but became a liquid.

This is a perfectly simple thing which you must have seen for yourself a hundred times—whenever you look out of a train, for instance. As you breathe, a great deal of water comes out of your mouth and nose. This water, having come from the inside of your warm body, is itself so warm that it is in the form of a gas ; but when this warm gas strikes the cold glass of the window-pane it is cooled so much that it is turned into a liquid, and will run down the pane in little drops. If you cool any gas sufficiently it must become liquid.

HOW THE EARTH COOLED OUTSIDE WHILE THE CORE WAS RED-HOT

Now that part of the Earth which would soonest become cooled would not, of course, be the hot inside—which perhaps consists of a gas at this very moment—but would be the part next to the surface. All the kinds of stuff that were most apt to become liquid would become so, and, being heavier, would fall towards the centre ; while the kind of stuff, like the air of today, which is not so apt to become liquid, would stay where it was.

So that we can imagine an Earth with a core of hot gas and a layer of liquid outside that, and then a layer of cool gas, or air, outside that. But soon even part of the stuff that had become liquid would become solid, or perhaps like a thick oil.

It must be remembered that all this time the Earth was twisting round and round like a top, as it has done ever since. Also it must be remembered that the great Sun is all this time pulling as hard as it can upon the Earth by means of gravitation. We can imagine, then, that the liquid stuff next to the Sun at any given moment would be apt to be pulled out towards the Sun or heaped up at the surface of the Earth. But, of course, as one point of the Earth is never opposite the Sun for long, this heaping-up of the liquid on the surface would be like a wave travelling over the surface of the Earth. Now this great travelling wave is nothing else than a *tide*, and every child who has been to the sea has seen its consequences. But the first tides that were raised by the Sun upon the Earth were not tides of cold water ; the Earth was too hot for that, and all the water in it was in the form of a gas in the air, like the water in your warm breath before it strikes the cold window-pane.

THE WAY THE BEDS OF THE OCEANS MAY HAVE BEEN MADE

The first tides that rolled upon the Earth must have been terrible tides made of stuff like red-hot lava—the red-hot stuff that comes out of a volcano and runs down in fiery streams until at last it turns quite cold and solid.

It is much more than probable that a very remarkable thing happened somewhere about this time. The men who have studied this subject believe that one day, while these tides of lava were rolling round the Earth as she spun, part of the stuff was whisked off like drops from a wet umbrella when you spin it. Perhaps at this time the surface of the Earth had become cool enough for the great gaps left by this loss to remain more or less fixed, and some people think that those gaps are now the basins of the seas.

WHAT BECAME OF THE BIT OF THE EARTH THAT BROKE OFF ?

But what became of the stuff that would then break off ? Its shape at first, of course, would be very irregular, but as it went on moving and became cooler, and as its parts acted upon one another by gravitation, it would become round, and men believe that the Moon was formed from the Earth in this wonderful way. At first she was very near the Earth, and for a long time afterwards she went farther and farther away. But even now the Moon is really close to us, not so far off as ten times round the Earth.

The Story of Immortal Folk Whose Work Will Never Die

The Boy Handel is discovered playing in the garret in the night

THE KINGS OF MUSIC

It has been said that if a man were permitted to make the ballads of a nation he need not care who should make its laws. In that sense, the composers of the world's music have been unconscious law-givers, moulders of national moods and aspirations. But their names and work are lost, for the history of civilisation is like a tree; it has its roots in the ground, and we are ignorant of the source from which its fruits are sprung.

That music was of great consequence to antiquity we know from the Bible. In Assyria, Babylon, and Egypt its sounds form many records of religious and social life. The Israelites were an intensely musical people, and it is thrilling to reflect that, if history does not err, the songs they sang by the waters of Babylon were heard again when they re-built Jerusalem, and that the melody of those same songs was preserved in the hymns sung in our first Christian churches, and still linger, floating like spirit voices in the sacred music of our day.

To the Greeks, music was a sacred influence ranking even higher than the majestic drama and poetry of the age. Aristotle preserves for us a splendid saying of his age; "To reform or to relax the manners of a people it suffices to add a string to the lyre or to take one from it."

But the music of that marvellous age is lost with the bulk of the literature and sculpture and painting which made Greece the fount of the whole world's inspiration. Barbarism submerged the world, and we know no more of musical composition for the first 14 centuries after the Crucifixion than for the 14 centuries which preceded it.

So music had to await the Renaissance, when it came again to us as part of the rebirth of knowledge, and then three men arose to build, on foundations unknown to us, the new edifice of music which is ours.

The first was Giovanni Pierluigi da Palestrina, son of peasants born out in the country near Rome about 1524, who, mastering all that could be taught him of current musical methods, reformed music as Cimabue reformed painting. When Pope Pius IV decided to bring into use a higher form of music for the Church than then existed, Palestrina wrote three masses, of which the third was a masterpiece.

"That," said the Pope, "is such melody as St. John heard from the sacred altar when heaven was revealed to him." He decreed that the music of Palestrina should be the model for all future church music, and it was so for two centuries.

At about the same time two great figures appeared in England. The first was

Thomas Tallis, " father of English Cathedral Music," born at Waltham Abbey, somewhere about 1515, a choirboy in London, who became organist at Waltham until the Abbey was dissolved. During the greater part of his 70 years he composed much music for religious services, vigorous melody of which much still survives.

WILL WILLIAM BYRD COME TO BE THE SHAKESPEARE OF OUR MUSIC?

But Thomas Tallis is of still greater consequence to us from the fact that he was the instructor of William Byrd, born at Lincoln in 1542, or a year later, organist at Lincoln Cathedral, then associated with Tallis as honorary organist at the Chapel Royal. In order that he might live, Queen Elizabeth gave him and Tallis the sole right to print and publish music in England. They lost handsomely on that, so they were each given other people's land and contrived to survive.

Byrd composed all sorts of music with the ease and ecstasy of the song of a bird, music for the organ, for orchestra, and for the voice.

> Since singing is so good a thing,
> I wish all men would learn to sing;

he wrote, and he tried to make them sing by furnishing them with good music. He died in 1623, leaving his country a glorious heritage of melody. But he and his work were forgotten, as completely as Shakespeare was forgotten for a century. Only now is his work being lovingly sought out and published. The results show him to be the greatest of all our old composers. The next generation will probably regard him with the veneration given to Shakespeare, a great authority has said.

THE MAN WHO WOULD MAKE A GOOD SONG IN FIVE MINUTES

Hitherto Henry Purcell, born in 1658, has held place as the greatest of our old melodists. Certainly he had the rich and varied genius which illumined the days of Elizabeth and was fast running out in Purcell's era. He began his career as a chorister in the Chapel Royal, and by the time he was 21 had composed music for an address, while, if authority is to be trusted, his magnificent Macbeth music was written in his 14th year.

For some years he was a copyist at Westminster Abbey, then organist there, and even composer. He wrote anthems, songs, chants, and a host of things for the theatre, not full operas as we now have, but exquisite masques, processions, operas-within-operas, as it were, pieces for voices and orchestra to be incorporated in plays where the major part is spoken.

His style was dignified, rich, and splendid, so original that we are only now discovering that supposedly new methods were practised by Purcell. He could compose a song in five minutes, and the song lived.

For the last 40 years the Purcell Society has been slowly publishing our great man's works, and each new volume adds to our wonder and delight. When all is out and known we shall find that in Byrd and Purcell (who died in 1695) England had two of the greatest composers of all time.

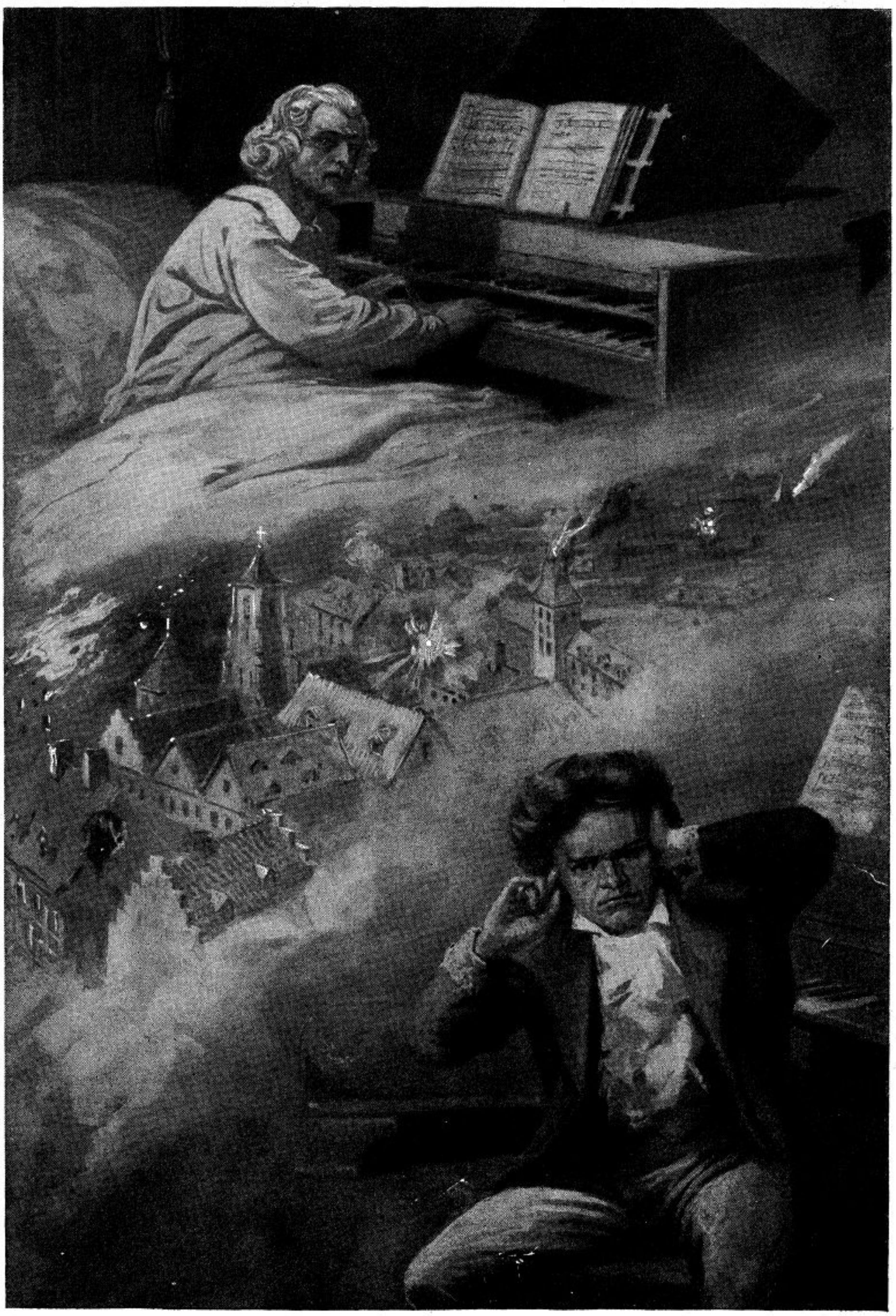
Fire destroyed a now-forgotten English school of painting; time and neglect hid Byrd and Purcell for centuries; but they are advancing at last to their thrones in the hearts of a posterity which will not again forget. They were the English forerunners of our adopted son, George Frederick Handel, with whom starts a history in which there has been no break.

HANDEL, WHO VERY NEARLY SET THE BIBLE TO MUSIC

Handel was a German, born at a little town called Halle in 1685. His father was one of those seventeenth-century barbers who were at the same time doctors and dentists, and he had made up his mind that his son should be brought up in the profession of the law. But music was in George's blood, and nothing would check his ambition to be a composer. He smuggled a rickety spinet—an old-fashioned kind of piano—up to the attic where he slept, and at night, when all the others were in bed, he played and played until he mastered the instrument. His father soon realised that it was no use keeping him back from his desire, so he procured him good teachers, and did everything that he could to help him forward in his chosen art.

Well, in time Handel began to compose big works, mostly operas. But the operas had no great run on the Continent, so he came to London and settled down there. For long years he did almost nothing but write operas, and he generally rented a theatre of his own. He had some successes, but he had more failures; and, in fact, was twice bankrupt over his opera business. Yet if Handel had not failed with his operas we should never have had those grand oratorios by which we know him now. For he turned to

KINGS OF MUSIC AMID THE NOISE OF WAR



Over a century ago, when the French army was firing on Vienna, two men sat listening to the guns. In a cellar sat Beethoven, trying to shut out the guns from his ears lest they should ruin his hearing; in another room Haydn, with his dying fingers, played the Austrian anthem to try to drown the noise. It is a wonderful picture, this picture of two of the world's great musicians, sitting, while life and power were ebbing from them—for Beethoven *did* become deaf, and Haydn died—helpless in the face of the great destroyer of mankind, the curse of War.

oratorio when he had exhausted himself with opera. An oratorio is a long sacred composition for voices, the words nearly always taken from the Bible.

Somebody has said of Handel that he set the Bible to music, and he very nearly did. He wrote more than twenty oratorios, though not more than three or four of them are performed today. But one alone of the three or four would have been quite enough to immortalise the name of Handel, for it is to Handel that we owe The Messiah, heard all over the country every Christmas. Just as we think of Paradise Lost when we think of Milton, or of Robinson Crusoe when we think of Defoe, so it is The Messiah that comes to our minds when we think of Handel. And he wrote it—this long work, which takes more than two hours to sing—in twenty-three days!

THE GREAT FOREIGNER ENGLAND CLAIMS AS HER OWN

Of course, he wrote other things that we like to remember besides his oratorios. Every young pianist plays his Harmonious Blacksmith, and violinists and singers often have his name in their programmes.

But, after all, he is *the* great composer of oratorio, with only Mendelssohn as a faint rival; and it is something to be proud of that we can almost claim him as English from his long residence among us. He was, indeed, a naturalised Englishman, and when he died, in 1759, they laid him beside our own great men and women in Westminster Abbey, where we may see a monument representing him in the act of writing "I know that my Redeemer liveth" for The Messiah. We may also see his house in Brook Street, Hanover Square. He had a fiery temper, and once threatened to throw a singer out of the window. But he was pious and charitable too, and we like to know that he gave an organ and much of the money he drew from his oratorios to the Foundling Hospital. They have a new organ there now, but some of the original pipes of Handel's organ are in it.

The greatest musician who was living in Handel's time was Johann Sebastian Bach. The two, Handel and Bach, are often spoken of as if they were a sort of Siamese twins of music. They were both Germans, and they were born within a month of each other. Both, again, were fine organists; both gave great religious works to the musical world; and both were stricken blind in their later years. Beyond that, they had not much in common. Handel never married, Bach was a quiet, stay-at-home man who married twice and had a family of twenty sons and daughters. He was an organist first of all, and his organ compositions, after all these years, are the most perfect things of the kind ever produced.

BACH, THE GREAT COMPOSER WHOM HANDEL LOVED LIKE A BROTHER

All looked up to him, and took their cue from his seriousness and his calm dignity. Beethoven was enthralled by his B minor compositions, and came away deeply impressed and wondering. Mendelssohn, Schumann, Wagner, Brahms—every one of them revered Bach as their godfather in music. So, while we may not hear very much of Bach's own music, we should never forget that we are as good as hearing it in the works of those who came after him. This wonderful genius died in 1750, nine years before Handel, who mourned for him as for a brother.

Now we will take another pair—Mozart and Haydn. It has been remarked as strange that Bach and Handel, though they were born, both Germans, in the same year, and lived practically throughout the same period, never met. It was not so with Mozart and Haydn. They met often, and they were very fond of each other. It was Hadyn who described Mozart as the most extraordinary, original, and comprehensive musical genius ever known.

THE POOR PEASANT BOY WHO BECAME THE FATHER OF MODERN MUSIC

Haydn was the father of most of the instrumental forms of music now regarded as *fixed* forms—the symphony, the sonata, the string quartette, and the like. That is to say, he wrote works in these departments which every composer feels to be the right models to follow.

That was a notable achievement for a poor boy who had to go out into the world to earn his own living at an age when boys nowadays are at school. The parents of this great composer were humble Austrian peasants, living in a wretched farmhouse when he was born, in 1732.

But Haydn had one advantage: his musical abilities, discovered in early childhood, were not thwarted by his father. The father insisted on a very severe training for the boy, and the young prodigy was taught his crotchets and quavers with

CHIEF MUSICAL COMPOSERS OF THE WORLD

Sir E. Elgar

Leoncavallo

Mozart

Balfe

Schumann

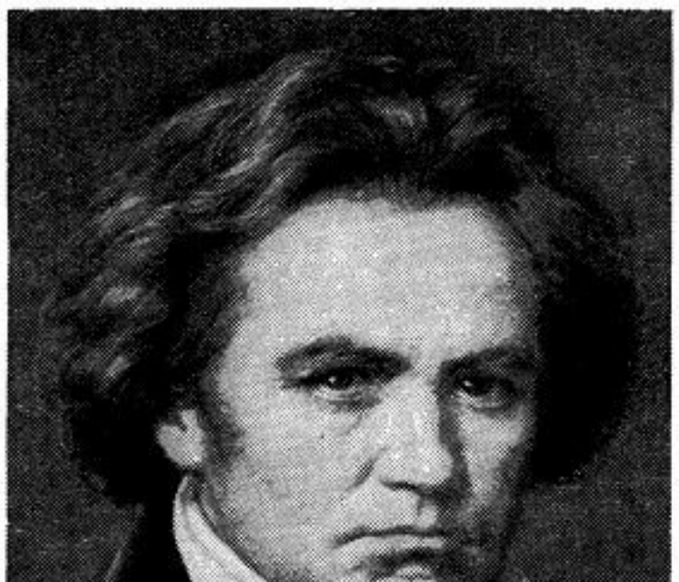
Pietro Mascagni

Gounod

Sullivan

Dr. Strauss

Handel


Beethoven

Wagner

Von Weber

Rossini

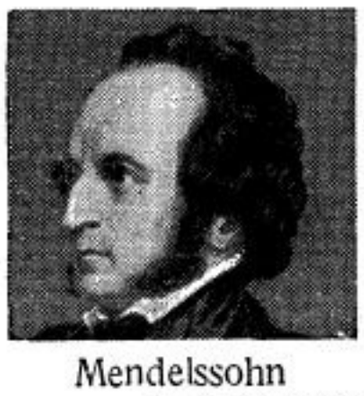
Palestrina

Tschaikowsky

Haydn

Schubert

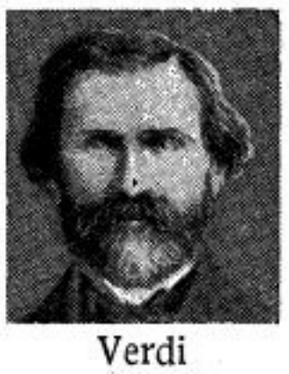
Liszt


Mendelssohn

Chopin

Bizet

Purcell

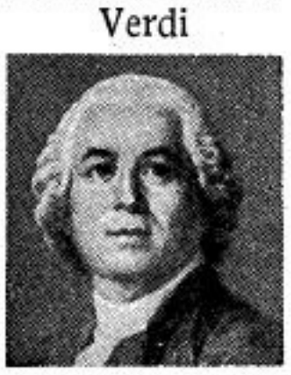

Verdi

Brahms

Grieg

Bellini

Bach


Gluck

Giacomo Puccini

many floggings when things went wrong. He developed a good voice, and so was sent to sing in the choir of Vienna Cathedral. But the day came when his voice broke, and he was of no more use to his choirmaster, who might have kept him resting until his voice recovered and set; but Haydn had displeased him. One day he played a boyish prank on a fellow-singer by cutting off his pigtail, and now he was dismissed from the choir.

You would not like to hear of all the hardships he endured for long after this. He became a singing teacher's servant; he fiddled at dances and even in the streets!

THE HAPPY DAYS OF HAYDN AND HOW HE WROTE HIS BEST MUSIC

But he was perfecting himself in composition all the time; and a set of sonatas he wrote took the fancy of a wealthy countess, who introduced him to pupils who paid well. Henceforward he had no trouble in getting on. In 1760 he married, not very happily, and a year later he entered the service of the Esterhazys, one of the richest Austrian families of the time. Great families kept a permanent band of their own in those days, and Haydn was the Esterhazy bandmaster. The post gave him a good salary and a comfortable home, and he went on with his composition under most favourable conditions.

That was until 1790, when the Esterhazy orchestra was disbanded. Then he came to London on a visit, and wrote for certain London concerts some of those symphonies which we still delight to hear. Altogether he wrote about 150 of these symphonies. Mozart saw him just before he left, and wept at the parting. "We shall never meet again," he said; and it proved true. In the music of our Church hymnals we find a tune called Austria, with Hadyn's name attached. It is almost as well known as God Save the King; and it was after hearing God Save the King in London that Haydn felt that he must make a national tune for his own country.

THE TENDER HOMAGE OF ONE GREAT MUSICIAN FOR ANOTHER

He went home and wrote God Preserve the Emperor, and then somebody made the air into the hymn-tune that we have sung so often.

His symphonies are still played by our leading orchestras; his piano music is in all the publishers' lists; and his oratorio of The Creation ranks as a good third to The Messiah and Elijah. Haydn wrote The Creation in his old age, and it was in listening to a performance of it that he made his last appearance in public. The excitement was too much for him. "Not I, but a Power from above created that," he cried out at one point. They carried him away, and, as he passed, Beethoven fervently kissed his hand.

Haydn's music is for the most part bright and genial. Young people, at any rate, must always love Haydn and his music, for young people do not want to be made miserable when they play the piano or listen to the band. And Haydn will never make them miserable.

Neither will Mozart. A young man once asked Mozart to tell him how to compose. The gentle Wolfgang Amadeus, for these were his Christian names, made answer that the questioner was too young to be thinking of such a serious occupation. "But you were much younger when you began," said the aspirant. "Ah, yes, that is true," replied Mozart, with a smile; "but then, you see, I did not ask anybody how to compose." No! Mozart, born at Salzburg in 1756, was only five when he composed a minuet and trio that boys and girls of much maturer age might play with some effect today.

HOW MOZART BECAME POOR AND DANCED TO KEEP WARM

His father was a good musician, and Wolfgang had a sister, Maria Anna, who at first showed nearly as much talent as himself. Hence they all started on a musical tour, in the course of which Mozart played before the Empress Maria Theresa, and romped with the little princess who afterwards became Queen of France—the unfortunate Marie Antoinette. These great ladies used to take him on their knee, kiss him, and shower gold upon him.

It was Mozart's happiest time, for, from the day that he began life in earnest as a married man—that was in 1782—the wolf of poverty was never away from his door. He composed incessantly, but even successful composition did not pay then as it does now, and the butcher and the baker were often worrying poor Mozart for a settlement of their accounts. A friend called one winter day, and found Mozart and his wife waltzing round the room. "We were cold," they said, "and we have no wood to make a fire." Let us think of that, and then think of the glorious works

that Mozart produced under such depressing conditions. He left 769 compositions in all, and he was still under forty when he died.

In his own day he was regarded chiefly as a composer of opera, and we still think very highly of his Don Giovanni, The Magic Flute, and The Marriage of Figaro, though we seldom have a chance of hearing them. He wrote 49 symphonies, and conductors still like to have some of these played, particularly the so-called Jupiter symphony, and one in G minor, which has been described as his tenderest and daintiest instrumental composition. All his works are full of charming melody.

THE STORMY DAY WHEN MOZART WAS LAID IN AN UNKNOWN GRAVE

Mozart's end was very sad. He was taken ill in 1791, and during his illness he wrote a famous Requiem, a sort of funeral song, which he had sung around his death-bed, to hear its effect. Then, on his funeral day, a great storm arose, and only the undertaker and his men went to the cemetery to see him buried. He died so poor that his remains had to be put into a pauper's grave, where many other coffins lay. Nobody bothered with the grave for many years, and then it was found that nobody could point it out. So Mozart's monument in the great Vienna cemetery stands over an empty grave. It is pathetic to think of such an end of a great man.

There was another composer who went through very much the same sufferings, the same persecutions and fate as Mozart. His name was Franz Schubert. "My music is the product of my genius and my misery," Schubert said. It could hardly be otherwise. His people were poor, and he had eighteen brothers and sisters, from which we may judge that no special attention was given to his education and upbringing. But as truth will out, so will genius. Schubert entered upon music as a prince enters on his dominions. When they began to teach him they found that somehow he had learnt the rudiments for himself.

THE MUSIC OF SCHUBERT WHICH CAME OUT OF GENIUS AND MISERY

He began to compose at eleven, and consumed as much music-paper as would have made a small fortune for a stationer. He wrote all kinds of things at that time—overtures, symphonies, quartets, operettas, Church music, piano music, and so on. But now we remember him almost solely for his songs, and a few orchestral pieces. He is Germany's greatest classical song writer. He composed more than 500 songs, but only a small number of these are popular. The one we are most likely to hear is The Erl King, the poem written by Goethe.

One afternoon Schubert took up a volume of Goethe's works lying on his table. He read The Erl King. The rushing sound of the wind and the terrors of the enchanted forest were instantly changed for him into realities. Every line seemed to flow into strange, unearthly music as he read; and, seizing a pen, Schubert dashed down the song nearly as we know it. He got a great singer to sing it, and then a Vienna music publisher, who had hitherto declined to have anything to do with his songs, asked for it.

He paid Schubert a very small sum, though in a few months the publisher made £80 out of it. That was the way with Schubert all along. Some of his finest songs were sold for the price of a meal. Grinding poverty, slights, insults, disappointments innumerable—that was Schubert's portion. He died in 1828, before he was quite 32, and they laid him to rest near Beethoven, at whose death-bed he had shed tears; and this inscription was put on his tomb: "Music buried here a rich possession and yet fairer hopes."

THE TWO MEN LISTENING TO THE BOMBARDMENT OF VIENNA

We have still to speak of Beethoven. Recall Haydn for a moment. When Haydn was dying in Vienna, in 1809, the French were bombarding the town. Haydn's servants were terrified, but Haydn took it all very calmly. He asked to be lifted from his bed to the piano, and when he had got seated he played his own Austrian Hymn three times over, while the guns were thundering outside.

Now at that very moment there was another composer in Vienna, crouching in a cellar, with cotton-wool stuffed in his ears. That composer was the mighty Beethoven. His hearing had begun to go, and he was frightened that the sound of the explosions would still further endanger it. Think of a musician being *deaf!* You might as well think of a painter being blind! Yet Beethoven, in some respects the greatest composer who ever lived, became almost totally deaf. The infliction embittered all his later years, and turned

an originally lovable man into a kind of surly bear. He would throw the soup in his housekeeper's eyes when it did not please him, and rage and growl over most trivial annoyances. Let us be charitable to him; it must have been awful not to be able to hear his own compositions.

But Beethoven, apart from his deafness, had a very hard life. Born in 1770, at Bonn, that pretty little university town on the Rhine, where they have preserved his birthplace just as it was, he had to work his way up in a home directed by a father who was a confirmed sot.

THE YOUNGSTER WHO WAS TO MAKE A GREAT NOISE IN THE WORLD

The father was musical, and he set Louis to work at the piano, and visitors would often see the child late at night shedding tears over the keyboard. By and by he was sent to Vienna to complete his musical education. There he met Mozart, who exclaimed, when he heard him play: "Pay attention to this youngster, for he will yet make a noise in the world."

Beethoven's works for the piano—particularly his sonatas—are the grandest things of their kind ever written. All the great pianists regard him as the king of composers for their instrument. And so, too, with the orchestra. Take away Beethoven's Nine Symphonies—the immortal nine, they are sometimes called—and we should take away the *backbone* from the orchestra. He did not write very much for the voice, for he was essentially an instrumental composer; but he left one beautiful song, called Adelaide, and one great opera, called Fidelio. He passed away in March, 1827, and Vienna never before saw such a great funeral as his.

FREDERIC CHOPIN, THE POLE, AND THE EVERLASTING MENDELSSOHN

There was another great composer for the piano, and he wrote the most poetical, dreamy, emotional things that we are ever likely to hear from that instrument. The name of this composer was Frédéric Chopin. He was a Pole, born near Warsaw in 1809, and his music seems to breathe the romance that we commonly associate with his nation. He was a consumptive, and died early, in 1849, after a long struggle with disease and weakness. There was something feminine about him, but perhaps that is just why we find his music so refined, and so full of emotion and grace. He is really the poet of the piano—nothing strong and grand about him, like Beethoven—with an ethereal grace and charm such as we find in no one else.

Another great composer who met him in 1834 gave him the significant pet name of Chopinetto. This was Mendelssohn, a German, born the same year as Chopin, who said of one of his pieces: "It is so perfectly beautiful that I could go on for ever playing it." One might say the same of several of Mendelssohn's own compositions. He was born to wealth and happy worldly circumstance, and never had to struggle with poverty or other ills.

So his music is bright and genial, clever and pure, manly and refined. His Songs Without Words are among the classics of the piano; and his oratorio Elijah ranks in popularity next to The Messiah. It was written specially for our Birmingham Musical Festival—for Mendelssohn had a great affection for the English people, and liked London better than Berlin or Leipzig. He had a short life, but his early death, in 1847, seems to have been hastened by grief at the loss of a favourite sister.

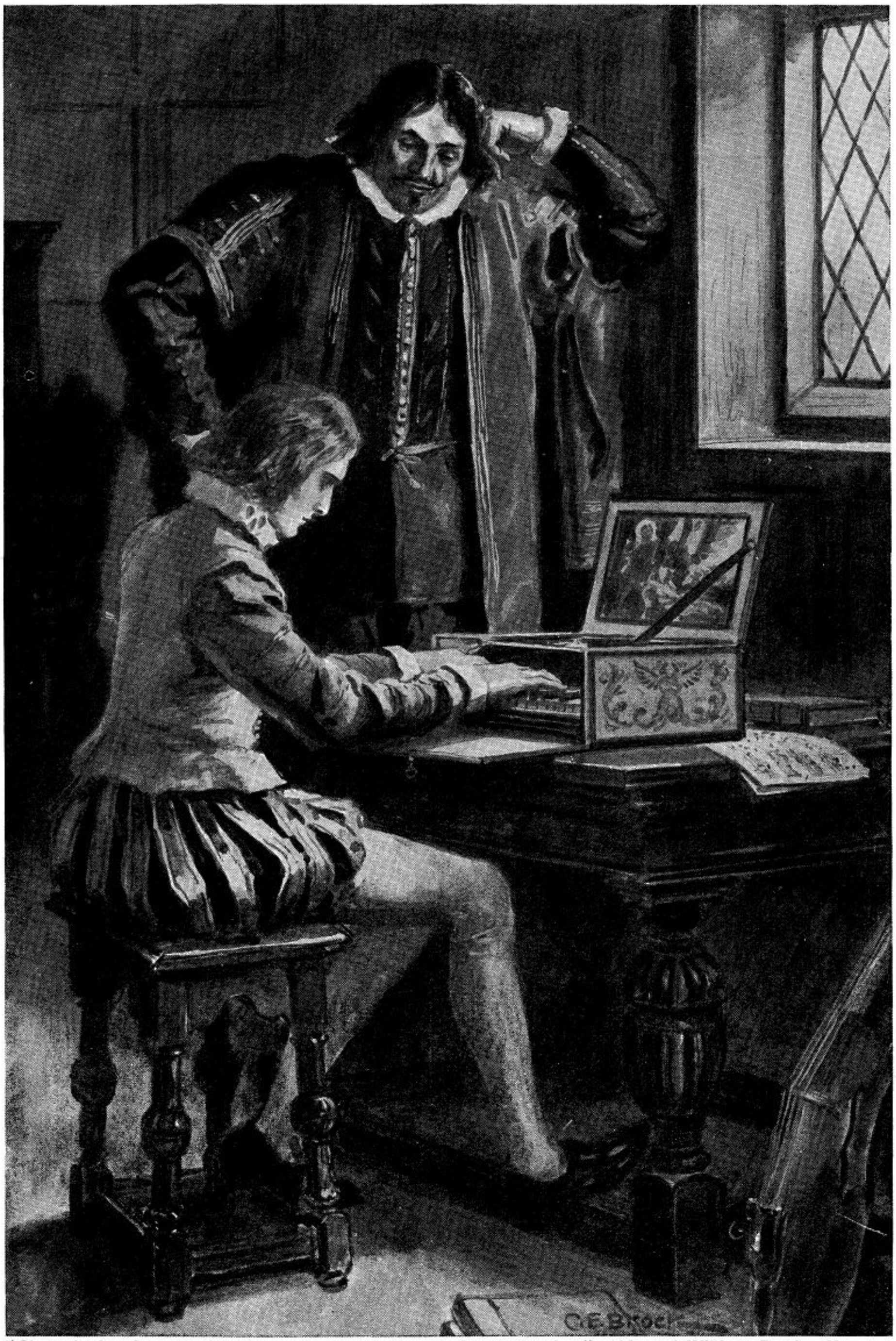
POOR ROBERT SCHUMANN AND HIS LITTLE ALBUM OF PIANO PIECES

A composer of a very different type was Robert Schumann, born at Zwickau, in Saxony, in 1810. There was no reason for his being unhappy, for his father was a publisher in easy circumstances. But there was a taint of insanity in the family. Schumann's sister died at twenty of an incurable melancholy; and Schumann himself spent his last years in an asylum, after trying to drown himself in the Rhine.

We can thus understand that his music is of a rather sombre cast. But we must remember, too, that he was the composer of that Children's Album of pieces which every little player of the piano gets acquainted with. Schumann wanted to be a great pianist, and to that end contrived a tiny machine of his own for exercising the third finger, which, we know, is not so supple as the other fingers. The machine hurt his hand, and he had to give up his ambition. But here again we have profited, for if Robert Schumann had been a great player it is not likely that he would have been a great composer.

We come to the great name of Richard Wagner. Musical people have been building up Wagner's fame in recent years, perhaps in return for the neglect he suffered during his life. He is not a composer in whom children can take a very deep interest, because he wrote little

THOMAS TALLIS LISTENS TO HIS CLEVER PUPIL



"Since singing is so good a thing, I wish all men would learn to sing," said good William Byrd. Here we see him practising on his virginal, to the delight of his famous master, Thomas Tallis.

but those great musical dramas upon which he prided himself so much, Lohengrin, Tannhäuser, The Meistersingers, The Flying Dutchman, Tristan and Isolde, and the rest. He had an idea of his own about opera, and it was that the words are of equal importance with the music.

RICHARD WAGNER, WHO THOUGHT OF WORDS AS WELL AS MUSIC

The older opera composers thought the music was everything, and the words of their operas were often silly to the verge of nonsense. Wagner changed all that, and if we read the words of his operas we may enjoy the mere story perhaps almost as well as the music. He liked to deal with old German myths and legends, and we find his tales of Lohengrin and Tristan and Tannhäuser exceedingly interesting. He, too, was a German. He was born at Leipzig, in 1813, and had a very troubled career until the crazy King Ludwig of Bavaria, who happened not to be crazy about music, took him up and gave him money and a home, which saved him to the world. He died in 1883, and he is buried at Bayreuth, where his final home was, and where he had created a specially constructed theatre for his works.

From Wagner we may turn to our own Sir Arthur Sullivan—born in 1842, died in 1900—who, when he was studying at Leipzig, was believed by his teachers to be destined to become England's greatest composer. We cannot call Sullivan a really great composer; but at least he must have our thanks for all the pleasure he has given us by his refined and splendid comic operas. He fell short of true greatness in his grand opera and his oratorio work, but we never think of that when we are listening to the tuneful melodies, the bright, sparkling choruses, and the charming instrumentation of that long string of familiar works which he wrote.

SIR ARTHUR SULLIVAN AND THE JOLLY OPERAS HE LEFT US ALL

In these delightful works, he successfully established something altogether new in British musical art. His comic opera music "wears well," as we might say, and there is no reason why the operas should not be as popular fifty years hence as they are today. Many people know Sullivan only by these operas, but he was a very versatile composer, and he wrote some fine hymn tunes which can never die. One of them we all know—the tune St. Gertrude, sung to Onward, Christian Soldiers. And who does not know such songs of his as Sweethearts and The Lost Chord? For the first of these he received £700 from the publisher, and the second brought him a handsome yearly income. Out of his comic operas he made more money than any other composer ever made out of music.

There are so many more composers to write about, when one begins to go over the names. There is Gounod, for example, the Frenchman who gave us the always popular opera of Faust. There is Rossini, the Italian who gave us William Tell and the world-famous Barber of Seville, and other operas that our fathers and mothers knew very much better than we do. Verdi, too, we ought to remember for his Il Trovatore and much later works of a more masterly kind. Weber, also, for his Der Freischütz, Meyerbeer for his Les Huguenots, Donizetti for his Lucia, Bellini for his La Sonnambula, and Balfe for his ever fresh and welcome Bohemian Girl.

SIR EDWARD ELGAR AND HIS SERVICES TO OUR NATIONAL MUSIC

Sir Edward Elgar, born in 1857, seems to embody again the spirit of one of the old masters. A poor man's son, he had just as hard a struggle as they, but he educated himself from old books of music and so obtained firm foundations for his natural genius.

Whatever he attempted he did supremely well, from his Dream of Gerontius, The Apostles, The Kingdom, on to his great instrumental pieces. "His work," said a great German, "shows that England is once more to take her proper place among musical nations, for he is a worthy descendant of the great masters of music who gave England her fame in the Middle Ages."

We ought to speak of Liszt, the greatest of all the great pianist-composers; of Tschaikowsky, the Russian master, whose Pathetic Symphony and 1812 Overture are familiar everywhere; of Strauss and his Domestic Symphony; of Puccini and his La Bohème; of Grieg, the national composer of Norway; of Brahms, of Bizet and his Carmen, of Mascagni and his Cavalleria Rusticana, of Leoncavallo and his Pagliacci; and there are a host of others. Many modern composers we are not very sure of yet; but of the really great we may safely say, in the words of Ben Jonson, that they are "not for an age, but for all time."

BEAUTY AND THE BEAST

A RICH merchant had three daughters. The two elder ones were cross and ugly, but the youngest daughter was so sweet and lovely that she was called Beauty. But the day came when the merchant lost nearly all his money. He had to sell his grand house and go to live with his daughters in a little cottage. He was too poor to keep any servants, but Beauty willingly undertook all the work of the house, and even tried to find excuses for her lazy sisters when they stayed in bed till quite late in the morning and allowed their younger sister to wait on them all day long.

One day, while the merchant worked in his garden, a letter was handed to him. He opened it, and learned that if he could go to a distant town he would be able to obtain work. Overjoyed at his good fortune, the merchant embraced his daughters, and prepared to set out.

"What shall I bring you when I return?" he asked Beauty.

"I want a new dress!" cried both the elder daughters before Beauty could answer.

"I will bring you the best that I can afford," replied the merchant. "And you, Beauty, what would you have?"

Beauty knew that it pained her father to feel that he no longer had the means to buy costly presents for his children, so she said quietly: "A rose, father, just a beautiful rose, if you can find one," thinking that such a present would cost him nothing.

So the merchant set out, and, after travelling for a whole day, reached the town to which he was journeying, and received his orders. The following day he prepared to return, but he had not gone far when, to his dismay, he discovered that he had taken the wrong turning. He was in the midst of a huge forest, and knew it was very unlikely that he would meet anybody of whom he could inquire his way.

After searching in vain for the right path for many hours, a terrible storm arose, and the merchant, in despair, climbed up into a tree in the hope of finding a light to guide him to some house. Sure enough, he saw a light, and, regaining the ground quickly, he leapt upon his horse and was soon before a magnificent castle.

For a moment he waited, but as nobody appeared he dismounted and strode up the steps. The house was brilliantly lighted from top to bottom, and on every side were signs of wealth and luxury.

The merchant passed through the great hall, blazing with lights, and found himself in a fine room. In the centre stood a table loaded with good things, and the merchant, being very hungry, sat down and made a

good meal. When he had finished, he began to feel very sleepy. Opening a door at the end of the room, the merchant found himself in a comfortable bedroom. He got into bed, and soon fell asleep.

In the morning, to his intense astonishment, he found a new suit of clothes in the place where he had left his old ones. He thought this strange, but he put them on and went to the dining-room, where he found breakfast awaiting him.

When he had finished an excellent meal, he rose and wandered out into the garden. The flowers were magnificent, and the sight of a lovely rose tree reminded him of his youngest daughter's request. Stooping, he cut a lovely bud, and placed it in his coat. Just then he heard a noise, and, looking up, he found the ugliest man he had ever seen, for, though he had a man's body, the face was that of a beast.

The merchant shuddered.

"Ungrateful man!" roared the Beast. "Did I not feed you when you were hungry, and shelter you for the night? And yet you repay me by robbing me of my flowers. Ingratitude is a sin I cannot pardon; in an hour from this time you must die!"

"Forgive me, I pray you!" cried the merchant, falling on his knees. "I did but pick a rose for my daughter, and could I have found you sooner I would have thanked you for all your kindness."

After some pleading, the Beast consented to forgive the poor man if he would promise to send in his place the first living thing he saw on returning to his home; and the merchant, hoping that this would be his dog, who always ran to welcome his master long before anyone else had heard his footsteps, gladly promised, and departed.

To his horror, his first sight as he drew near the house was Beauty.

"Oh, what a beautiful rose!" she exclaimed, kissing him.

"Alas!" replied the poor man sadly, "you little know how dear it has cost me." And, drawing her to him, he led her inside and told her the whole story.

"What you will do when I am gone, my poor children," he concluded, "I do not know."

"But you are not going," declared Beauty bravely, "for I shall go instead." And, in spite of everything that the merchant could say, Beauty insisted on having her own way.

And so the next day they both set out for the castle, where they found a splendid supper awaiting them. They sat down to eat, and had scarcely finished when the Beast appeared. He looked at Beauty, and Beauty lifted her eyes and saw him. She shuddered and moved closer to her father. "What a dreadful man!" she was thinking. "I do hope he will kill me quickly."

But the Beast did not want to kill one so lovely, and he told her father that if he would go home and leave her behind no harm should befall her.

So the merchant rode sadly away, and Beauty was left alone in the huge castle. But the Beast scarcely went near her all day, and when night came he showed her a beautiful little room, which he told her was hers. Sure enough, on the door was written "Beauty's Room," and inside was everything she could wish for. That night Beauty dreamed that a fairy came to her and bade her be not afraid, for she was quite safe.

The next morning she rose early and wandered through the gardens, but not one single person did she see. When she felt hungry she went to the dining-room, where she met the Beast.

"Do you think me very ugly?" asked the Beast.

"Well—yes," replied Beauty.

He spoke so gently that she felt quite sorry for him.

The Beast sighed and left her. The next day she met him again.

"Will you marry me, Beauty?" said the Beast.

"Oh, no, no, no!" cried Beauty, for, much as she pitied him, she could not bear the thought of marrying him, and the Beast went away looking very unhappy.

Soon after this, Beauty looked into a magic glass, and saw that her father was very ill. The next time she met the Beast she begged to be allowed to visit her home.

"If you go away, it will kill me," said the Beast; "but rather than see you unhappy I would bear any pain. Go, but you must return in a week."

At parting, the Beast gave her a magic ring, which would take her home and bring her back again when she wished to return, and Beauty was very much surprised to find how sad the parting with the great, ugly creature made her.

BEAUTY SAVES THE LIFE OF THE BEAST

AS BEAUTY SPOKE A WONDERFUL CHANGE CAME OVER THE BEAST

Her father was so rejoiced to see his daughter alive and well that he quickly recovered, and Beauty was so happy to be at home again that she forgot all about her promise to the Beast. The week slipped by, and then another, until one night Beauty dreamed that the Beast was dead. She burst into tears and awoke. She dressed quickly, and with the aid of her ring was soon back again in her little room in the palace.

She ran out into the gardens, and there, in a swoon, by the fountain lay the Beast. Beauty threw some water upon his face, and presently he recovered. When he saw her, he smiled.

"I could not live without you," he said faintly, "and so I tried to starve myself to death."

"Oh, you must not die!" cried Beauty, wringing her hands. "I will marry you, dear Beast, for it is surely better to be kind than to have a handsome face."

As she spoke a wonderful change came over the Beast, and even as she looked the Beast was transformed into a handsome prince, with whom she instantly fell in love.

Beauty was so astonished that she could scarcely believe her eyes. Taking her hand, the young man explained that a wicked fairy had cast over him a spell, which could not be removed till some gentle girl should promise to marry him, ugly as he was.

Beauty's father was overjoyed to hear the good news, but the disagreeable sisters were as jealous as they could be, and said such unkind things to Beauty at the wedding that the Prince turned them into statues, and placed one at each side of the palace gates, where they stand, still and cold, to this day.

THE HUNGRY FOX AND THE KITTEN

A VERY hungry fox was prowling one moonlit night about a farmhouse, and he met a little kitten.

"You're not much of a meal for a starving creature," he said. "But in these hard times something is always better than nothing."

"Oh, don't eat me!" said the kitten. "I know where the farmer keeps his cheeses. Come with me and see."

She led him into the farmyard, where there was a deep well with two buckets.

"Now, look in here, and you will see these cheeses," she said.

The fox peered down the well, and saw the moon reflected in the water.

"This is the way down," said the kitten, jumping into the top bucket. Round and round rattled the rope-wheel, and down went the kitten into the water. Happily, she had gone down before, and she knew what to do, and, climbing out of the bucket, she clung on to the rope.

"Can't you bring up one of the cheeses?" said the fox.

"No; they are too heavy," said the kitten. "You must come down."

Now, the two buckets were connected, so that when one went down the other came up. As the fox was much heavier than his little companion his bucket went down and the water drowned him, while the kitten came up and escaped.

CUNNY RABBIT AND THE LION

CUNNY RABBIT was a little creature, but he was very shrewd. Even the lion was not a match for him. The lion stole a fawn from a gentle doe, and would not give it back. The doe appealed to all the great beasts for help, but they were afraid of the lion. Then she came to Cunny Rabbit, and Cunny Rabbit said: "Tell all the animals to meet in council tomorrow at my burrow."

In the meantime Cunny Rabbit dug a long underground passage from his burrow to an outlet behind a distant bush. The animals met in council and listened to the case, and they decided that the fawn was the child of the lion. None of them dared to speak the truth, because they saw that the lion was watching them with angry eyes. But Cunny Rabbit peeped out of his burrow, and boldly cried out in a loud voice against the lion.

"Nonsense! The fawn belongs to the doe. The lion is a thief!" cried the rabbit.

The lion sprang at him, but Cunny Rabbit darted down his passage and came out behind the bush, and escaped.

"I'll starve him out!" roared the lion. He waited and waited by the burrow for Cunny Rabbit to appear. He grew thin and feeble, but still he would not give in, for he thought that if he went in search of food Cunny Rabbit would get away. So there he stayed till he starved to death, and the doe was able to recover her fawn.

ANDROCLES AND THE LION

ANDROCLES was a poor Roman slave who was carried away to Northern Africa many hundreds of years ago. His life was very hard and painful, and his master was a very cruel man. At last he resolved that he would try to escape to the sea-coast, and get back to Rome.

He knew that if he were caught he would be put to death; so he waited till the nights were dark and moonless, and he then crept out of his master's house and stole through the town, and got into the open country.

On and on he hastened through the darkness as fast as his legs would carry him. But when the day broke he found that, instead of making toward the sea-coast, he had struck into the great lonely desert. He was tired out, hungry, and thirsty, and seeing a cave in the side of some cliffs, he crept into it, lay down, and very soon fell into a gentle sleep. Suddenly he was awakened by a terrible roaring, and, starting to his feet, he beheld a huge tawny lion standing at the entrance to the cave. Androcles had been sleeping in its den. He could not escape; the great lion barred the way. Terror-stricken, he waited for the great beast to spring upon him and kill him with one blow.

ANDROCLES TAKING THE THORN FROM THE LION'S PAW

But the lion did not move. It moaned and licked one of its paws, from which blood was flowing. Seeing that the animal was in great pain, Androcles forgot his terror, and came forward, and the lion held up its paw, as if it were asking Androcles for help.

Androcles then perceived that a great thorn had got into the paw and cut it, and made it swell. He drew the thorn out with a quick movement, and then pressed the swelling and stopped the flow of blood.

Relieved of the pain, the grateful lion limped out of the cave, and in a few minutes it returned with a dead rabbit, which it laid beside Androcles. When the poor slave had cooked and eaten the rabbit, the lion led him to a place in the cliffs where there was a spring of fresh water gushing from the earth.

For three years the man and the lion lived in the cave. They hunted together and slept together, and the great, shaggy, affectionate creature used to lie down at night at Androcles' feet, and slowly wag his huge tail from side to side, as a cat does when it lies before the fire and feels happy and comfortable.

But at last Androcles began to weary for the society of his fellow men. So he left the cave, but he was soon caught by some soldiers and sent as a fugitive slave to Rome. The ancient Romans were very cruel to runaway slaves, and they sentenced Androcles to be killed by wild beasts in the arena on the first public holiday.

A vast multitude of spectators came to see the pitiful sight, and among them was the Emperor of Rome, who sat on a high seat above the arena, surrounded by his senators. Androcles was pushed into the great open space, and a lance was thrust into his hand. With this, he was told, he would have to defend himself against a powerful lion which had been kept for days without food to make it savage and fierce. So the poor man had a poor chance of surviving.

He trembled when the hungry lion sprang out of its cage with a terrible roar, and the lance shook in his feeble grasp as the huge beast came bounding up to him. But instead of rushing fiercely at him, and bearing him down, it wagged its tail and began to lick his hands. Androcles then saw that it was his own lion with whom he had lived in the cave, and he patted it and leaned on its head and cried.

All the spectators marvelled at the strange scene, and the emperor sent for Androcles, and asked him for an explanation of it. And he was so delighted with the wonderful story that he made Androcles a free man. Thereafter Androcles used to walk about Rome, and the faithful lion followed him like a dog wherever he went.

LITTLE STORIES FROM A BOOK THAT SHAKESPEARE READ

The most famous story-book of the Middle Ages was a book written in Latin called the Gesta Romanorum, which means the Exploits of the Romans. It was in this book that Chaucer, Shakespeare, and other famous poets found many of their plots; and we give here a few of these interesting stories.

THE DOGS THAT BECAME FRIENDS

THERE was a king who possessed two hounds, and these were kept chained up at some distance from one another. But directly they were let loose they flew at each other and began to fight fiercely. The king consulted one of his wise men as to what could be done to make the dogs live together as friends.

"Take them into the forest," said the wise man, "and when you see a fierce wolf, let one of the dogs loose. The wild animal will attack it. But just as it is being overcome, let loose the other dog, which will fly at the wolf, and the two dogs together will be more than a match for the wild animal."

The king did this. A wolf appeared, and one dog was let loose. When its strength had nearly failed, the other was let loose, and very soon the fierce wolf was slain. The first dog was so grateful to its companion for saving its life that ever after the two animals were firm and faithful friends.

ALEXANDER AND THE PIRATE

A SEAMAN named Diomedes for a long time sailed the seas in a galley, attacking the shipping, plundering the cargoes, and sinking the vessels. At last he was captured and brought before Alexander the Great, who asked angrily how he dared to trouble the seas as he had done for so long.

"Sire," said Diomedes, "ask rather how you dare to trouble the earth. I am master of only a single galley, and do but little harm, while you are master of great fleets, and carry desolation and war. Yet I am called a robber, and you are a king and conqueror. Did fortune but change, and I become more successful while you became less successful, our positions might be reversed."

This argument so struck the king that he forgave the pirate and made him a wealthy prince, on condition that he should give up his life of robbery.

THE CONQUEROR'S TRIUMPH

A CERTAIN king, after a great victory, appointed three honours for his successful general. He decreed that the victor should be greeted with loud hurrahs, that he should enter the capital in a triumphal car drawn by four white horses, and that the captives should follow the conqueror's chariot, bound hand and foot.

The general was greatly delighted at hearing this. But when the time came for all his honours to be enjoyed, he found that the emperor, to keep him humble amid success, had appointed also three annoyances to accompany the honours.

First of all, a slave rode by his side in the triumphal chariot, to remind him that even the poorest and least of mankind could attain to a position such as his; in the second place, the slave struck him a blow whenever the people cheered, so that his pride might be checked; and, in the third place, the people were allowed free licence to shout the most insulting remarks while the victor enjoyed his triumph, so that he might be reminded very plainly of his weak points.

THE GUESTS AT THE FEAST

A GREAT king made a feast, and invited everyone to it. He sent out messengers to all the cities and towns in his kingdom, asking the people to come, and promising not only food but wealth.

In one town there was a strong, robust man, who, unfortunately, was blind; and he loudly bemoaned the fact that his affliction would prevent his accepting the king's invitation. "Alas!" he said, "is there anyone so unlucky as I? Here is the chance of a lifetime, and because of my infirmity I am unable to take advantage of it." But presently he heard that in the same town was a lame man, who was also grieving that he would be unable to go to the feast.

The blind man and the lame man, therefore, came to an arrangement by which the blind man would carry the lame man to the feast, the lame man directing him. So the man who had sight but could not walk guided the man who could walk but could not see, and thus the two went together to the king's feast.

TRYING TO PLEASE EVERYBODY

A MAN who wanted to sell his donkey decided to take it to the nearest market town. So early one morning he set out for the town, accompanied by his son, and while the father rode upon the ass, the youth walked by the side.

Presently they passed three men going in the opposite direction.

"A nice father," said one of the men as he passed, "to ride while his poor son has to walk over the hard stones. He ought to walk himself and let his son ride."

Hearing this, the father dismounted and told his son to get upon the donkey's back. But they had not gone far when two women passed, and one remarked to the other: "A fine son, that! Rides comfortably on the donkey, and makes his poor old father walk. He ought to be ashamed of himself."

THE FOOL WHO WOULD PLEASE EVERYBODY—BY BYAM SHAW
This picture is in the Laing Art Gallery, Newcastle-on-Tyne

"It seems difficult to please people," said the father. "We had better both walk."

Just then some more people passed by and one said to another, in a loud voice:

"They seem to have little sense. Fancy walking when they have a fine strong beast like that! Why, it could easily carry both of them."

At this both the father and son mounted the donkey, and were getting along comfortably, when a man going in the opposite direction said:

"You ought to be ashamed of yourselves; two great, strapping men riding on one poor donkey!"

So father and son both dismounted, and allowed the donkey to search for thistles by the roadside, while they sat together on a bank and discussed how they could reach the town, which was not far distant, in such a way as not to displease any of the people whom they met on the road. At last a bright idea struck the son.

"Let us get a pole," said he, "and, trying the donkey's legs together, let us hang him on the pole and carry him to market. Perhaps that will please them."

"A good idea!" replied the father; so they broke off the branch of a tree close by, slung the donkey across the bough, and carried him to market that way.

They did not meet any more people till they were right in the town; but as soon as they were seen in the streets the people roared with laughter, and the boys began to follow them, jeering and shouting:

"Look, here are two fools, carrying their donkey to market instead of letting their donkey carry them!"

"I'll tell you what it is, son," said the man. "By trying to please everybody, we have pleased nobody. In future we will do just what we think right, whatever other people may say."

THE SHEPHERD'S HOARD

SHAH ABBAS, king of Persia, having lost his way when hunting, saw a young shepherd playing the flute under a tree while his flock grazed on the mountain side.

The frank countenance of the young shepherd pleased him. He questioned him on various subjects, and the lively and accurate replies of this child of the open fields, who had grown up untaught among his flocks and herds, so delighted the monarch that he decided to take him to his Court and have him educated.

In this favourable soil the young shepherd grew up to be a man of merit, and the king gave him the name of Ali Bey and made him Grand Treasurer.

Ali Bey possessed every possible virtue. His conduct was irreproachable ; absolute reliance could be placed in his fidelity and prudence in the exercise of his duties ; he was generous toward strangers and benevolent toward supplicants ; and, though he was the king's favourite, he showed reserve and humility.

Yet his great worth did not make him safe from slanderous tongues, for the courtiers looked on his rise with envy.

They laid all sorts of snares in his path ; they attempted to make the king suspicious of him. But Shah Abbas was no ordinary prince. His great soul knew no vile suspicion, and Ali Bey remained in peace and honour as long as his generous benefactor lived.

Unfortunately for Ali Bey, the great king died, and his successor, Shah Sefi, was a very different man. He was mistrustful, cruel, greedy ; he seemed to take pleasure in the sight of blood.

Such a sovereign gave the enemies of Ali their opportunity. They heaped calumny upon calumny on the Grand Treasurer. At first the king paid little attention, but at last their chance came.

The king desired to see a precious sword which Shah Abbas had received as a present from the Turkish Emperor. This sword could not be found, and Shah Sefi suspected Ali Bey.

This was just what the courtiers wanted. They redoubled their insinuations, and depicted Ali Bey as the most infamous of embezzlers.

" He has built a multitude of houses to give lodging to strangers," said they. " He has spent great riches on other public buildings. He came to Court without a penny, yet now he possesses unbounded wealth. Whence came all these valuables with which his house is filled if he does not rob the Royal Treasury ? "

Ali Bey came into the king's presence at the very moment that his enemies were accusing him.

" Ali Bey," said the angry monarch, " thy infidelity is well known ; I dismiss thee from my service, and I order thee to hand over thy accounts within 14 days."

" Lord," replied Ali Bey, " my life is in thy hands. I am ready, at this moment, to lay at the foot of thy throne the key of the Royal Treasury and all the marks of honour that thou hast conferred on me, if thou wilt deign to receive thy slave into thy presence."

This offer pleased the king. He accepted it and at once visited the Treasury. Everything was in perfect order, and Ali Bey convinced him that Shah Abbas had himself taken away the missing sword and had used the diamonds on it to decorate something else.

The king had nothing to say against these explanations. He therefore imagined some pretext for accompanying the Treasurer to his dwelling, so as to see for himself all the valuables of which his courtiers had spoken. But to his great surprise there too he found nothing to confirm his suspicions. He was about to leave when a courtier pointed out a heavy wooden door closed by two iron bars.

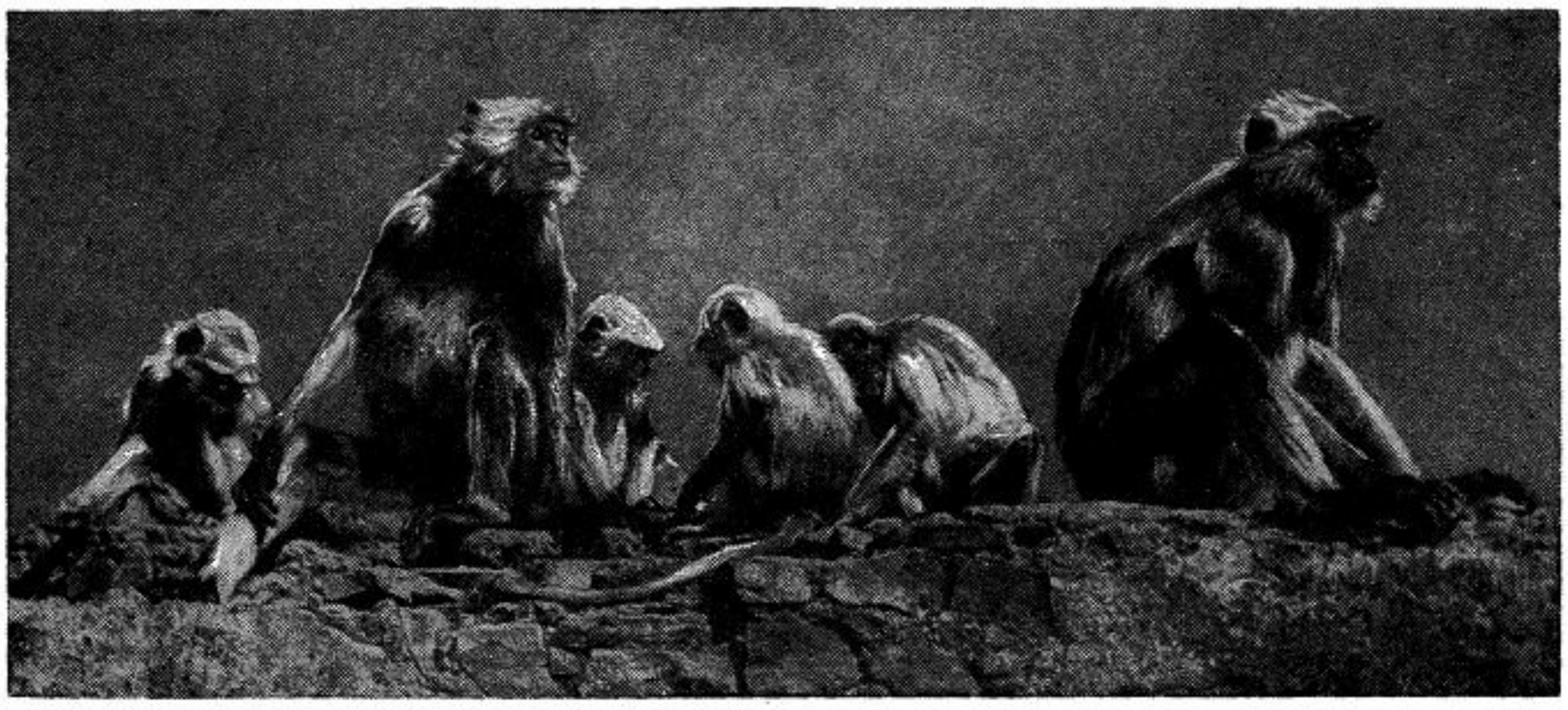
" What is there hidden behind these locks and bars ? " asked the king.

Ali Bey seemed abashed but, recovering himself quickly, said : " Lord, in that little room I keep what I cherish most in all the world, my own property. Everything you have seen in this house belongs to the king, my master. What is in there is mine. It is a secret. I beseech thee not to insist on knowing it."

The suspicious monarch gave an order for the door to be opened. But all that could be seen was four naked walls, a shepherd's crook, a flute, a poor cloak, and a satchel : such were the treasures shut up behind the locks and bars.

" O king," said Ali Bey, with the greatest modesty, " when the illustrious Abbas met me on the mountain where I was feeding my flocks these things were all my wealth. They are my only riches. Let me take them back to our peaceful valleys, where I was happier in my poverty than ever in thy opulent Court."

Nature's WonderfuI Living Family in Earth and Air and Sea



THE ANIMALS MOST LIKE MEN

MAN sees a grim likeness to himself in the animals which rank next to him in the scale of life. They form the group of creatures called Primates—the apes, the baboons, the monkeys, and the lemurs.

In a sense they are our distant kindred. We are not descended from apes, nor are apes descended from men, but far, far back in time a common source of life gave rise to two new forms. One, with a soul and a mighty brain, learned to walk upright, to use the hands for work, and to become lord of creation; the other retained its four-footed—or four-handed?—gait, kept to the trees, remained a pure animal, and came down to the present day as a wild caricature of ourselves.

Apes and monkeys have brains, but they are undeveloped, like those of the dawning mind of a human baby. But the difference from our own is in quality, not in kind. An ape appears to think as we think, though mistily; its movements and actions are governed by the same area of the brain as human actions are. Bone for bone, muscle for muscle, with slight modifications, a man-like ape resembles ourselves. In shape, in looks, in hairiness, in life-habits, it reproduces before our eyes what science, as the result of long investigation, has built up as the picture of the earliest members of the human family.

The gorilla is the sovereign of the order, not by conquest, for gorillas do not come in contact with the others, but they come at the head of the order in bulk and power. They are peaceful giants, only roused to wrath if their homes are invaded. Then, although they flee if they can, they attack the boldest man, no matter how well armed he be, if their little ones are endangered. They are entirely confined to the dim forest lands of the western half of Equatorial Africa, and when civilisation reaches there the gorilla will vanish from the Book of Life.

For their lives cannot be lived away from trees. Enormous as is their size, six feet and upwards in height, with a weight far exceeding a man's, they are ideally suited for climbing about in the leafy roofs of their forest aisles. Each foot is a hand, and all are used in climbing; the legs are short and sturdy, with the suggestion of a calf, the arms are so long that on the ground they serve as crutches. In the trees the giant beast goes with the ease and certainty of a huge squirrel.

It is so much like a nightmare vision of what a man might be that the gorilla is perhaps the most terrible of all things to look upon; yet when we come to know it it is, in youth at any rate, as engaging as any creature living.

No pet ever excelled the intelligence and gentle merriment of Johnny Gorilla, who lived for two years in London. Six or seven others in various stages of youth had died, all within a short time after their arrival at the Zoo, but Johnny was an exception. He was caught in the forest when about a day old, and was nursed by a native woman as if he had been human.

JOHNNY GORILLA AND HIS MERRY LIFE IN LONDON TOWN

He played with a kitten as a child does; he did all the usual monkey climbing; he romped like a child. When tickled he laughed tremendously, with a deep, hoarse chuckle; when annoyed he cried "Hock, hock." He called attention to himself by knocking on the floor with his fist, and when pleased with anything he had done he would clap his hands. He drank six pints of milk and water a day, ate fruit of all sorts, was terribly afraid of worms or anything else that crawled, as if he had an instinctive recollection of snakes; and he would jump like a child if a leaf stirred, then tremblingly advance, pick it up with nervous, outstretched arm, and smell it.

The orangs rank next in size to the gorillas, but, whereas the giants are restricted to Africa, the orangs have their homes in Borneo and Sumatra. It is interesting to note that in the land of black men the skin of the gorilla is black, while the orang, whose home is where men are a reddish brown, is himself reddish brown. Terribly ugly, the orang has the great gaping mouth of its order, with a dismal bony ridge over the brow and an extraordinary bony development round the face.

THE TERRIBLE CREATURE THAT GRIPS WITH FOUR HANDS

"The worst of playing with an orang," said a keeper of the apes at the Zoo, "is that you never know where he will have you, for *he grips with four hands*, and his strength is that of two men." But two fine orangs made history at the London Zoo. Jacob, the larger, is dead now, dying from a human complaint, tuberculosis; but at the time of writing his friend Sandy is in the enjoyment of health and vigour at 27. Caught when two years old, he lived in captivity for eight years in Singapore, and has spent 17 in London.

Sandy and Jacob were concerned in a famous breaking out. It began with Sandy, who, twisting off a piece of the stout wire of his cage, made it into a sort of chisel, then passed it through to Jacob, who was in the cage adjoining. Jacob improved on Sandy's plan, for, using the tool as a lever, he ripped open his wires and escaped into the ape-house. When a keeper scaled a ladder to recall him to a sense of home and duty, Jacob slid down and shook the ladder so violently as almost to throw his old friend from it.

Jacob must have dreamed of the ways of home. Through the glass beyond the wire of his cage he saw trees and grass and liberty, and one night he broke through the roof of his den again, knocked out a window with a flower-pot, slipped through, descended into the grounds, chose his tree, skipped up it, made a nest of broken twigs, and lay down and slept like a king in a castle. The keepers got him home in the morning, and pretended to be cross with him. But they photographed the nest and wired it round as a great treasure—the first nest ever built by an ape in England, and the first positive proof that orangs do really make nests to lie on in the tree-tops, as the old stories said they did.

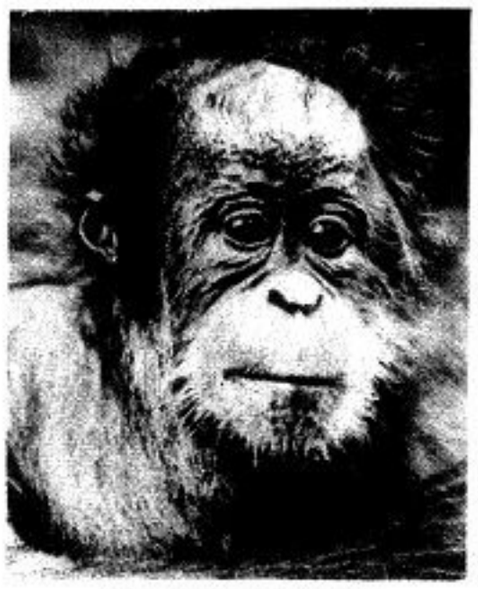
THE CHIMPANZEE AT HOME IN THE GREAT AFRICAN FORESTS

Next in size to the orang-utang is the chimpanzee, at home in the forests of Equatorial Africa, but with a range extending farther east than the orang, whom, so far as knowledge goes, he never meets Chimpanzees are heavily built, with massive arms and long, powerful hands and feet, but they are less formidable in teeth than the others, and, although grotesque and hideous, are really more like a caricature of a man than either of their relatives. A gorilla exceeds six feet, running up to nine, an orang averages about five, but the chimpanzee does not range above four.

Studied at short range they seem much the same in temperament and characteristics as the orang, but, as they are hardier, they are better known, and therefore appear to eclipse the others as the authors and imitators of clever tricks. They can open doors, they learn to use cups and saucers, to eat and drink politely, to sweep out their cages, to distinguish between the sexes and show more deference to a lady than to a man. They learn to count a little, to master a bicycle and roller skates, to dress and undress.

We shall never know what these apes are really capable of, because, while they are gentle and docile in their youth, they become sullen, morose, fearfully uncertain and often even dangerous to

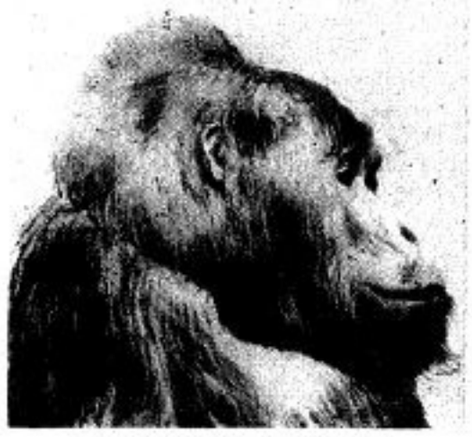
THE ANIMALS NEXT TO MAN



ORANG UTANG

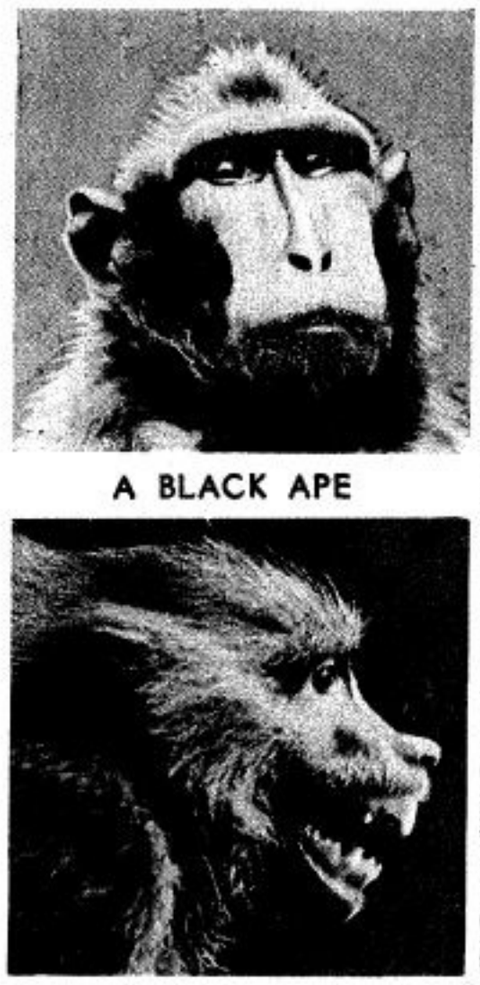
YOUNG MONKEYS

CHACMA BABOON



AN OLD GORILLA

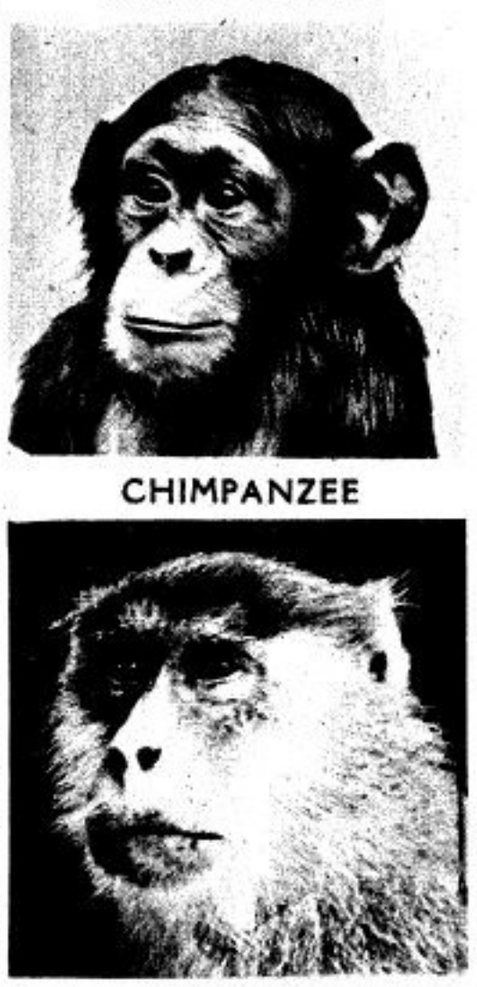
A BLACK APE



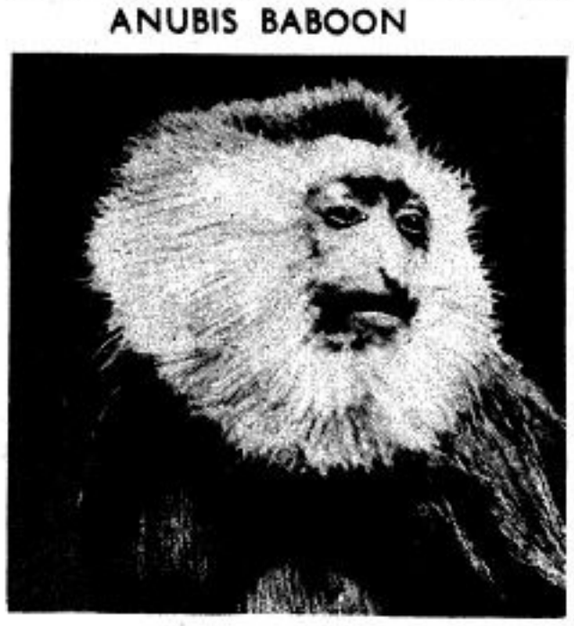
ANUBIS BABOON

ORANG UTANG

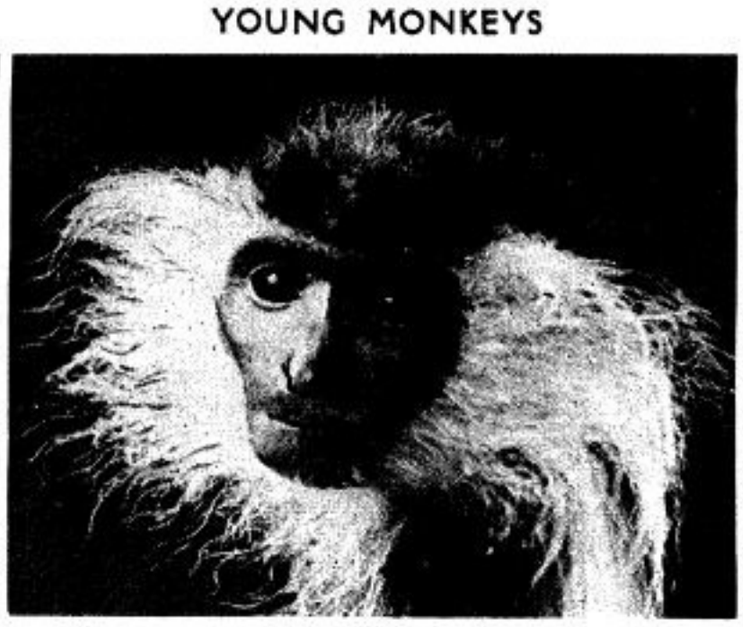
CHIMPANZEE



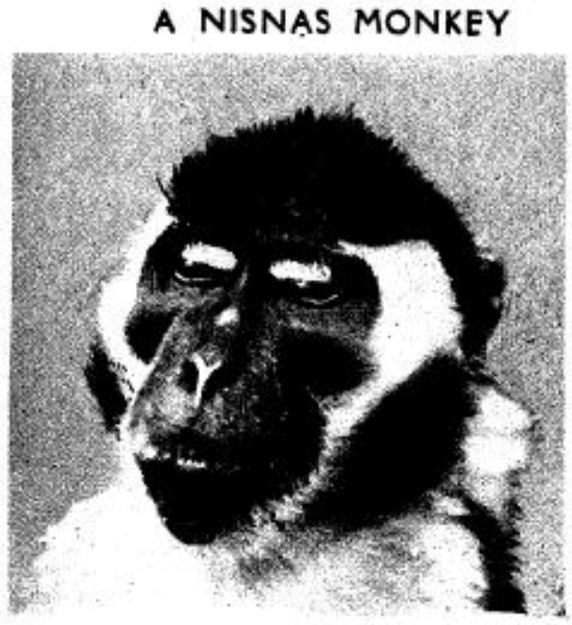
A NISNAS MONKEY



WHITE-TAILED GUEREZA



COLOBUS ANGOLAN MONKEY



WHITE-COLLARED MANGABEY

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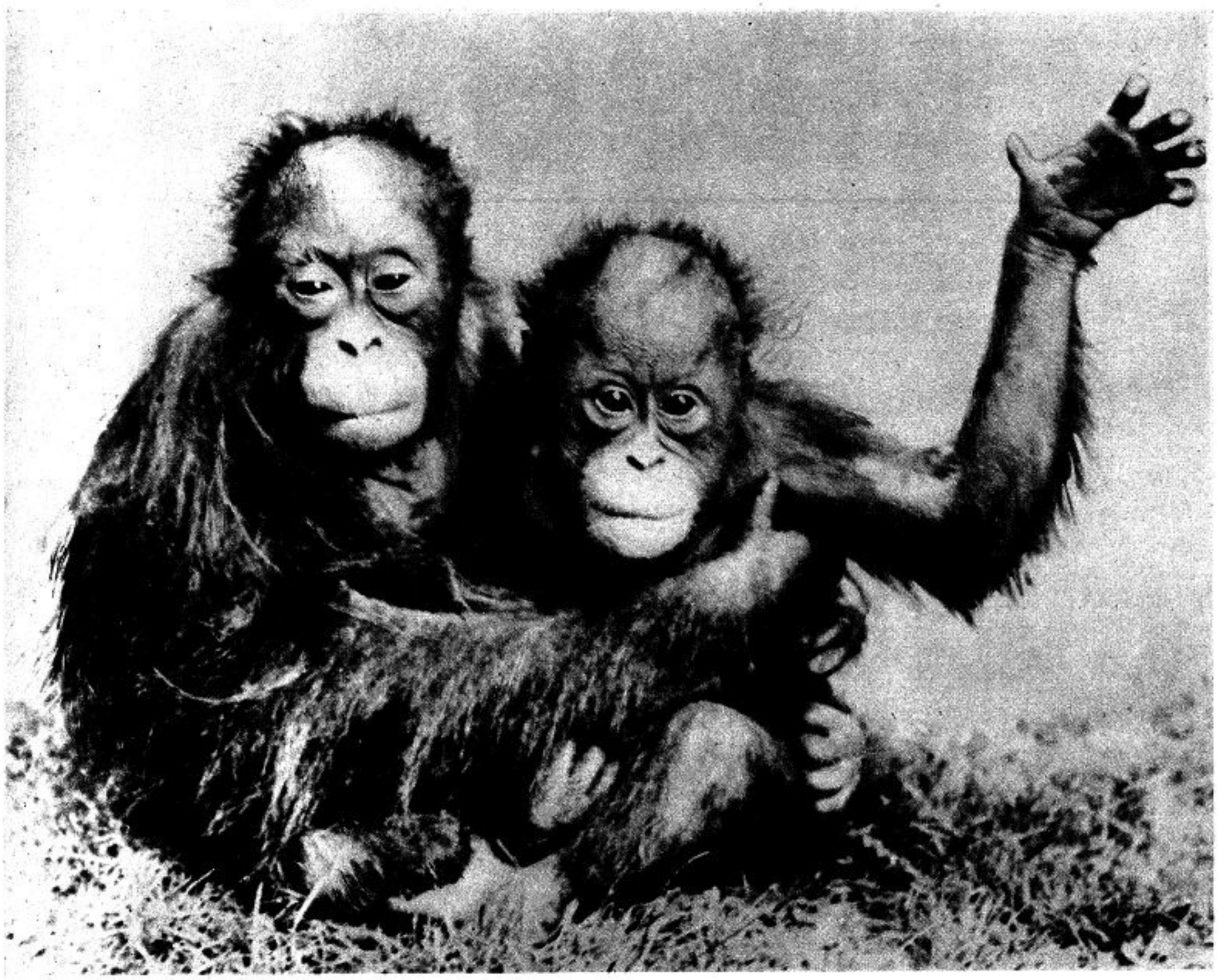
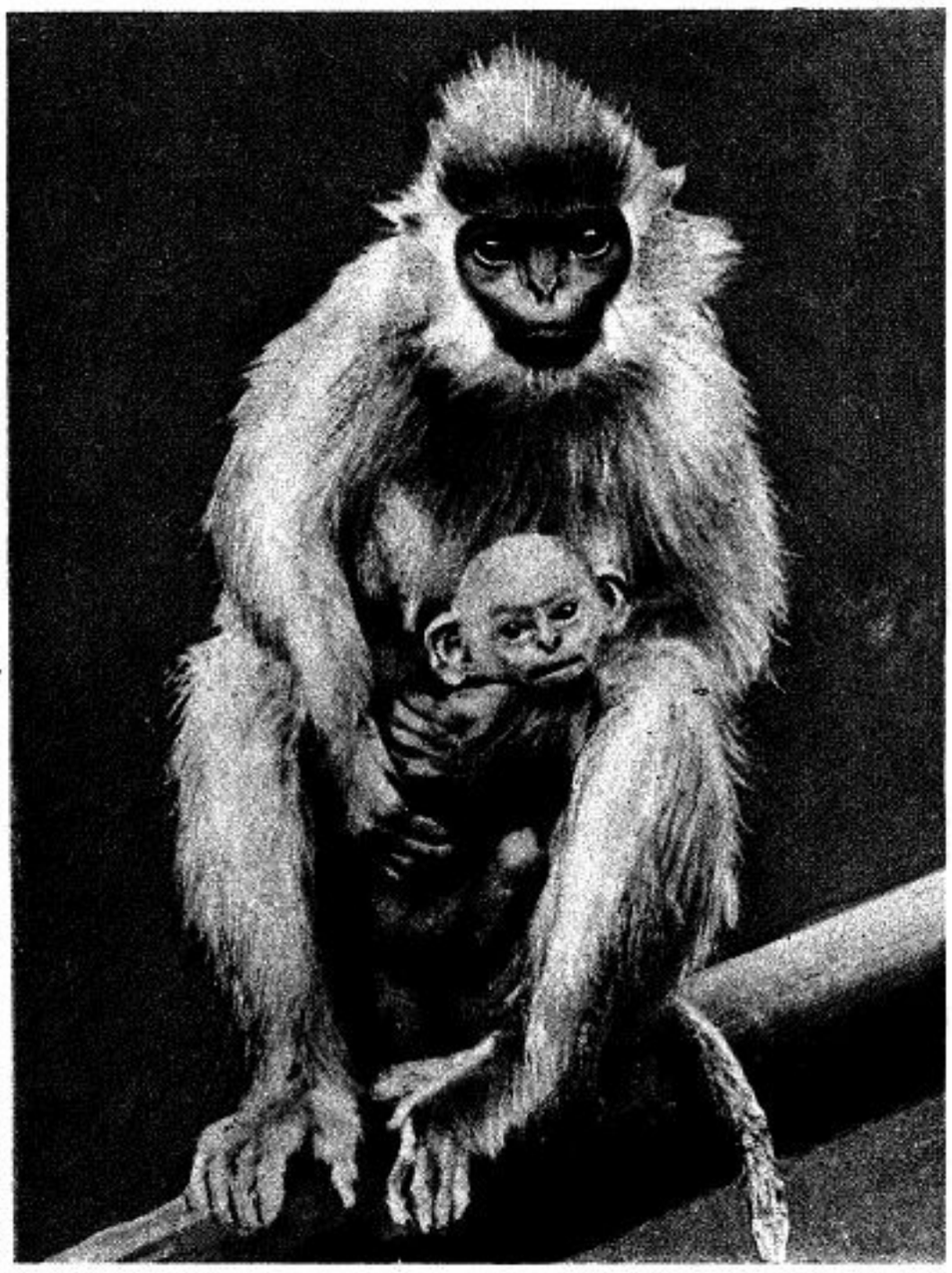


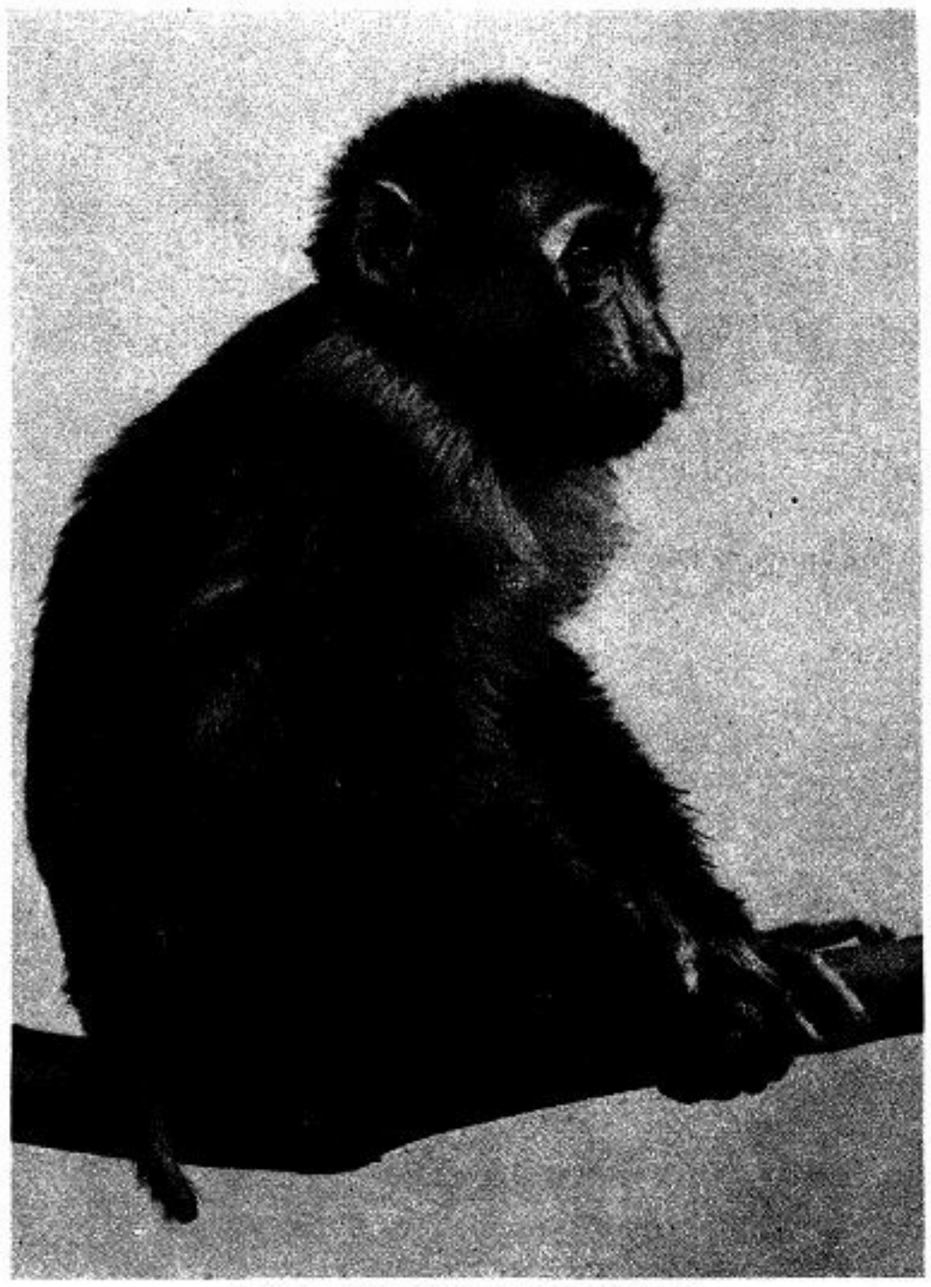
TWO BABY ORANG UTANGS SIT FOR THEIR PHOTOGRAPH

A BARBARY APE AND HER LITTLE ONE

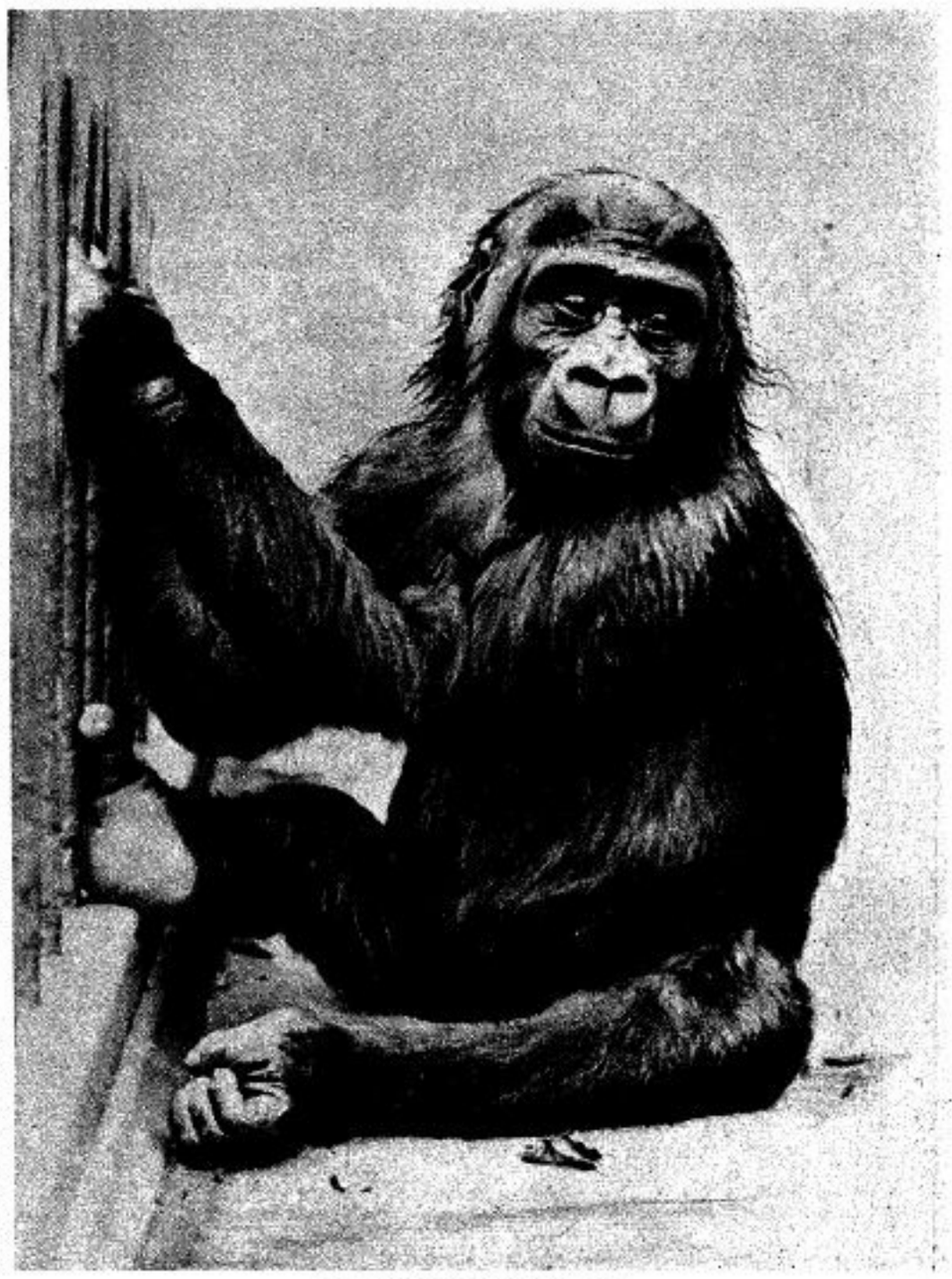


A CAPPED LANGUR WITH HER YOUNG ONE

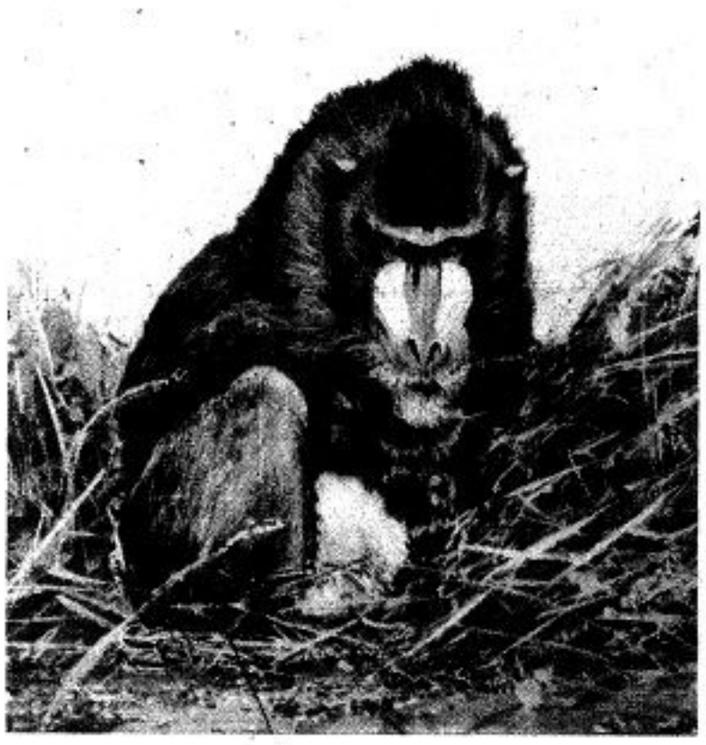
CHIMPANZEES IN PLAYFUL MOOD



THE PIG-TAILED MONKEY



JOHNNY GORILLA



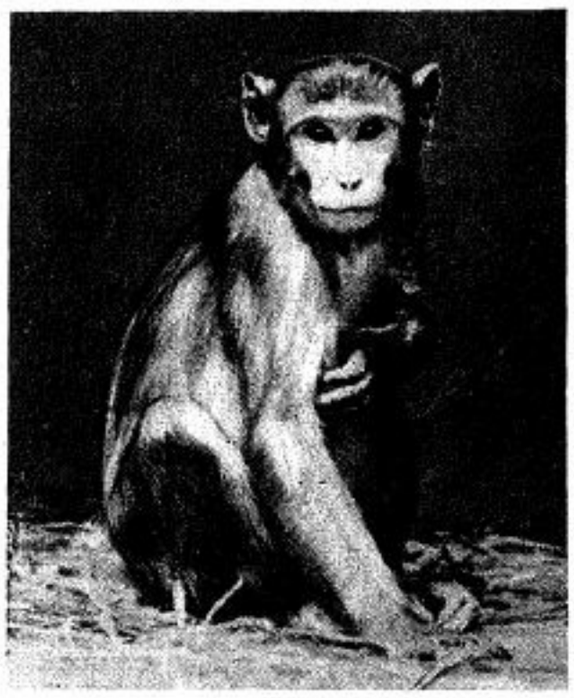
MANDRILL

MACAOUE MONKEY

WANDEROO MONKEY

GALAGO

YELLOW BABOON



RHESUS MONKEY

A CHIMPANZEE TAKES A WALK

CAPUCHIN MONKEY

SLOW LORIS

A GIBBON

RING-TAILED LEMURS

human beings as they grow old. Extraordinarily long of arm and lissom of body, the gibbons come lowest in the scale of the man-like apes. Their brains are small and primitive, so naturally they are the least intelligent of the group. They can be easily tamed, for they have brain enough readily to receive instruction and to perform wonderful feats of gymnastics. But that is a development of their natural excellence. Although they preserve a more upright, two-footed gait than the others, balancing themselves by carrying the long arms bent over the head, they are essentially creatures of the trees. They are not climbers so much as are the other three, but leapers, animals to whom a great range of forest trees is as a succession of horizontal bars to a gymnast.

THE GIBBONS THAT SWING THROUGH THE TREES BY LEAPS AND BOUNDS

They swing through a forest by leaps and bounds. Twenty feet, thirty feet, forty feet they leap. They clutch a bough with one hand, swing off and fly through the air, catch another bough forty feet away with the other hand, and then away again, hand after hand, hurtling through the air in this way.

There are nearly half a score species of gibbons, all natives of South-East Asia, and especially numerous in Malaya, but we must descend the scale to meet the lower four-handed folk—the monkeys, lemurs, and marmosets. It is a great array of life, with scores of species in the Old World and the New, some of them up in the snow-laden trees of the Himalayas, most of them in the tropical forest, but one small tribe assistant guardians of the Rock of Gibraltar.

THE STORY OF THE TEN APES ON THE ROCK OF GIBRALTAR

They are called Barbary apes, but as a fact they are simply a species of macaque monkey. They are very interesting to us for several reasons. *They are the last monkeys at liberty in Europe.* Their ancestors thronged Britain in the old, old days before the North Sea made us an island and before the collapse of a land-bridge had cut Gibraltar off from Africa. These few on the Rock are the sole survivors in Europe of days that saw England, Europe, and North Africa all one.

These Gibraltar monkeys descend from those from which the Greeks studied anatomy. They once warned the British garrison of an attempt by the Spaniards to recapture Gibraltar. They shared the common lot in the smallpox outbreak of 1894, and were reduced in number to fifty. Alas, by 1920 they had become so numerous and so bold that they invaded houses and frightened women and children in bed ; they stole ; they destroyed roofs; and, worst of all, their habits fouled the garrison's supply of drinking water. So the military order was, " Let no more than ten Barbary apes survive upon Gibraltar." Poor Barbary apes ! But they abound in Africa, and ten is a foundation for a new colony for the Rock.

But let us consider the monkeys in general, first distinguishing the Old World type from the New World type. The Old World species have the nostrils close together ; they have food-pouches in the cheeks, and they never use the tail for anything but balancing. The American monkeys have the nostrils wide apart, have no cheek-pouches, and many of them use the tail as a grasping organ, for which purpose it serves as a fifth hand. General habits agree fairly well ; a monkey is a monkey wherever you find him. Taking the average, they grow up in from five to six years, and are known to live as long as thirty years.

THE MONKEY THAT COOPERATES WITH MAN WHEN THE TIGER COMES

The seven genera of the Old World monkeys have the Langurs at their head, a widely distributed group, especially famous in India, where one of the species, the Hanuman, named after an Indian god, is sacred to the Hindus, and therefore at liberty to pillage right and left. Its long age of security has made the Hanuman the tamest of free monkeys, and, alone of wild creatures, it seems to recognise Man as a friend in the forest, and to cooperate in giving him warning of the presence of the most dreaded enemy of both, the tiger.

It may be so with other monkey tribes, but it is known that there are many Pharaohs among the grown-up male Hanumans, and they hate and kill young males if they can. But the mother Hanuman takes her little monkey Moses off into the forest to nurse and hide him until he is big and strong and can go back and fight for life, and perhaps for leadership. If her baby is a female the mother remains safely with the troop ; with a male baby she flees, and braves in solitude the terrors of tigers, snakes, leopards, and birds of prey for her little one's sake. That is mother love in a dim-minded monkey !

We now come to the baboons, creatures with large dog-like heads and huge teeth, ranging the lands north-east of the Red Sea. They are ferocious animals, yet capable of taming ; and in the wilds they are masters of combination, mutual assistance, and unity in the face of a common foe. They combine to raise a rock which one cannot lift, in order to seek insects and reptiles for food beneath it. Retreating up a hillside from pursuit, they roll stones down at their foes, and at need a detachment will advance in good order to rescue an unfortunate comrade. They are hideous and savage, but have splendid qualities. The old Egyptians worshipped them as if they were gods.

QUEER LITTLE MEMBERS OF THE TEN BIG GROUPS OF AMERICAN MONKEYS

The American monkeys, all creatures of the hottest parts of the continent, abound in the forests of the Amazon and the Orinoco. They are all tree animals, and it is they who have made extra hands of their tails. Wonderful creatures many of them are, clinging, climbing by their tails, even employing them as fingers to pick leaves and other food. There are ten big groups of them. Some have faces like tiny aged men ; among the squirrel monkeys we find little gems of pathos and comedy, which smile when they are pleased, shed tears when they are sad, and are all the while as mischievous as the tiny jolly baby children whom they resemble.

These are the midgets of the family ; at the other extreme are the howlers, giants by comparison, 30 inches long, and with voices which can be heard for miles when a howler is really trying to howl. They have howled so long, so much, and so loudly that their throats have changed to enable them to do their vocal best.

THE BEGINNING OF THE HONOURABLE AND ANCIENT ORDER OF PRIMATES

Those delightful pets, the marmosets, the special product of South and Central America, are much more like squirrels and ideal mice than monkeys ; but they are nevertheless four-handed mammals. They have 32 teeth, as we have, whereas an American monkey has 36. They are ancient and primitive ; they remain as a sort of living bridge to show how the monkeys crossed from a lower level of animal existence to the position they now occupy in the scale of creation.

Now we come deeper and deeper still, to the bed-rock of the order crowned by the inclusion of man ; the lemurs ! The honourable and ancient order of Primates took its rise in the humble lemurs and their kin. More like little foxes, opossums, mungooses, squirrels, seem the lemurs today. Yet science fixes on these animals as descendants from that source which gave rise to every monkey and every man-like ape in existence. Their headquarters is Madagascar. They reached Madagascar when it was part of the African mainland. A land bridge sank, and Madagascar was an island, and to the lemurs it became what Australia has been to the kangaroo and their cousins. There, sheltered from the turmoil and striving which urged other animals along the strong current of Evolution in the outer world, they let time and transformation go by.

Infinite variety marks the forms and colours of the lemurs—some like weasels, some like mice, going to sleep during the hot months like a desert plant and waking with the rain ; lemurs which are so meek and mild as to be called the gentle lemurs ; and so on, until we come to an extraordinary one called the aye-aye. This has teeth like a rat or a rabbit and a unique skeleton-like middle finger with a hook-like claw, a wonderful modification enabling the animal to scratch out insects from their hiding-places in the bark of the trees which it explores by night.

THE GALAGO, THE LORIS, AND THE LITTLE TARSIER

On the African mainland is a well-known lemur called the galago, which has kept itself and its sluggish fight against evolutionary progress to the densest twilight forests. Seeking farther we find the lorises, whose habits suggest the beginning of sloth life ; and at the end of the long procession come the tarsiers, with extraordinary little kangaroo-like hind legs, absurdly long feet and hands, and quite unique claws. The tarsier leaps like a kangaroo, springing from bough to bough. A native of the Malay Archipelago and the Philippine Islands, it is rarely found.

This quaint little animal preserves in its body one of the forms into which life was moulded when the first experiments of Life were begun with the newest and highest development of the greatest order then created ; when, out of the general body of mammals, the Primates were summoned into being, to yield tarsiers, lemurs, and apes, while, by a parallel ascent, man himself was painfully toiling upward to his kingdom.

The March of Man from the Age of Barbarism to the League of Nations

MAN BUILDS HIMSELF A HOUSE

FOR hundreds of years after the discovery of his mind man remained in the animal stage.

Let us take a good look at him before we go on to the next step in his progress. He was a little creature, brown in colour, covered with hair, nimble rather than swift, wiry rather than strong. His forehead was low, his eyes sunken and bright, his chin heavy and underhung. There was something of the gloom of great, far-stretching forests in his face.

He wore no clothes. He knew no language. He had no conscience. His life was concerned with food. All his ingenuity was directed to outwitting his enemies. The thought of God never entered his mind. The idea of Right and Wrong had no existence for him. Like an animal, he regarded the Earth as a larder, and like an animal he spent his time in searching for food.

Because enemies were numerous in the jungle, many of them hunting in packs, man very seldom travelled alone. Thus it came about that great companies of these little brown people would leave the dark forest together and make their way with clubs and stones to the open country and to the distant hills. In the course of centuries some of these hunting parties elected to live in the hills or on the banks of a river, making their dwellings in caves. Faith in their cunning, and an increasing knowledge of the Earth and its inhabitants, led the bolder of them to explore farther and farther afield, until at last the race of mankind was scattered over a considerable portion of the Earth's surface.

Then for some of these wanderers there happened a strange and alarming thing. They woke one night in their caves to find themselves shivering from head to foot. They went to the mouth of their caves and looked out. Nothing was to be seen there but a dense greyness. The Earth lay still ; the Sun was yet hidden ; and only a piercing coldness in the air told of something strange.

Day by day man looked at the sky. Perhaps his first articulate speech came from his perplexity. Where was the blue of the sky ? Why did the Sun give no heat ? How came it that the plants did not grow and the birds did not sing ?

A woman picked up the skin of a dead animal and wrapped it round her babe, who was crying with cold. A new idea was born on the Earth. Clothing ! An artificial skin ! Henceforth to the food question must be added this new question of clothes. The animal man walked the Earth in the skin of an animal, looking for food and fur.

A great wind began to blow. The skies became like lead. Little specks of white blew across the world, like feathers. Some of the women said, " Let us go back to the forests." They set fire to logs of wood in their caves. It was possible to keep warm ; but food ? There was no fruit, no grain. The earth became like iron, and on this iron earth lay a covering of those white feathers from the sky, bright, crisp, and cold to the feet—cold and wet.

The days moved strangely in these regions. Man had discovered another climate. Winter came with a fury and a power which were sometimes terrifying. But spring returned, and summer followed spring, and for a little time before winter there was the berry-time of autumn.

MAN SETTLES DOWN TO FIGHT THROUGH THE DARK WINTER

So man established his confidence in Nature afresh, and settled down to outwit his enemies and to defeat the dark, unprofitable months of winter.

But out of his sight there was a mighty change going on in Nature—a grinding of vast masses of ice clotted together in huge and awful confusion at the Poles. The Earth had not shaken down into steadfastness.

Suddenly there came to the ears of a few men who had long been watching strange movements of ice in the mountains a noise of crashing thunder from the hills. The cold intensified. The air became like crystal. Some of the people picked up their children and their skins and ran in panic for the valley. " Let us get back to the forest," was the cry.

But some remained in the hills, and saw among their peaks one day a blaze of whiteness, hearing at the same moment a crash that sounded like the collapse of all the mountains. They knew no more. In the next instant they were swept away, they and their caves, their very hills and rivers, their valleys and their trees—swept away under moving ice.

THE EXTRAORDINARY THINGS THAT HAPPENED IN THE GREAT ICE AGE

Glaciers had been observed for a long time, but this was something much greater than a glacier. It was the breaking away from their anchorage in Arctic regions of continents of ice—as if a giant had used a boulder to destroy a cheese-mite.

Marvellous is it to know that some portion of the human race survived this frightful calamity, in comparison with which the destruction wrought by all wars and pestilences in the history of man pales into insignificance. Such, indeed, was the destruction of glacial ages that the world itself was ploughed up into new shapes, whole continents plunged down into the depths of the sea, and new continents exposed from the depths of the Earth's interior.

The climate of the Earth was changed. Trees and plants appeared where they had never been before. Animals found themselves grazing on hills far across great oceans. Man appeared as a stranger in places where his ancestors had first learned to stand upright on their feet. And buried under the surface of the Earth were millions upon millions of creatures, among whom were multitudes of men, women, and children.

With this new birth of the world came a new birth in the mind of man. He ceased to be only a hungry animal in search of food. He became conscious of something in the world about him so much greater than himself that no cunning of his could outmatch its powers. He began to fear. The dark frightened him. A change in the weather terrified him. A dead person set him thinking.

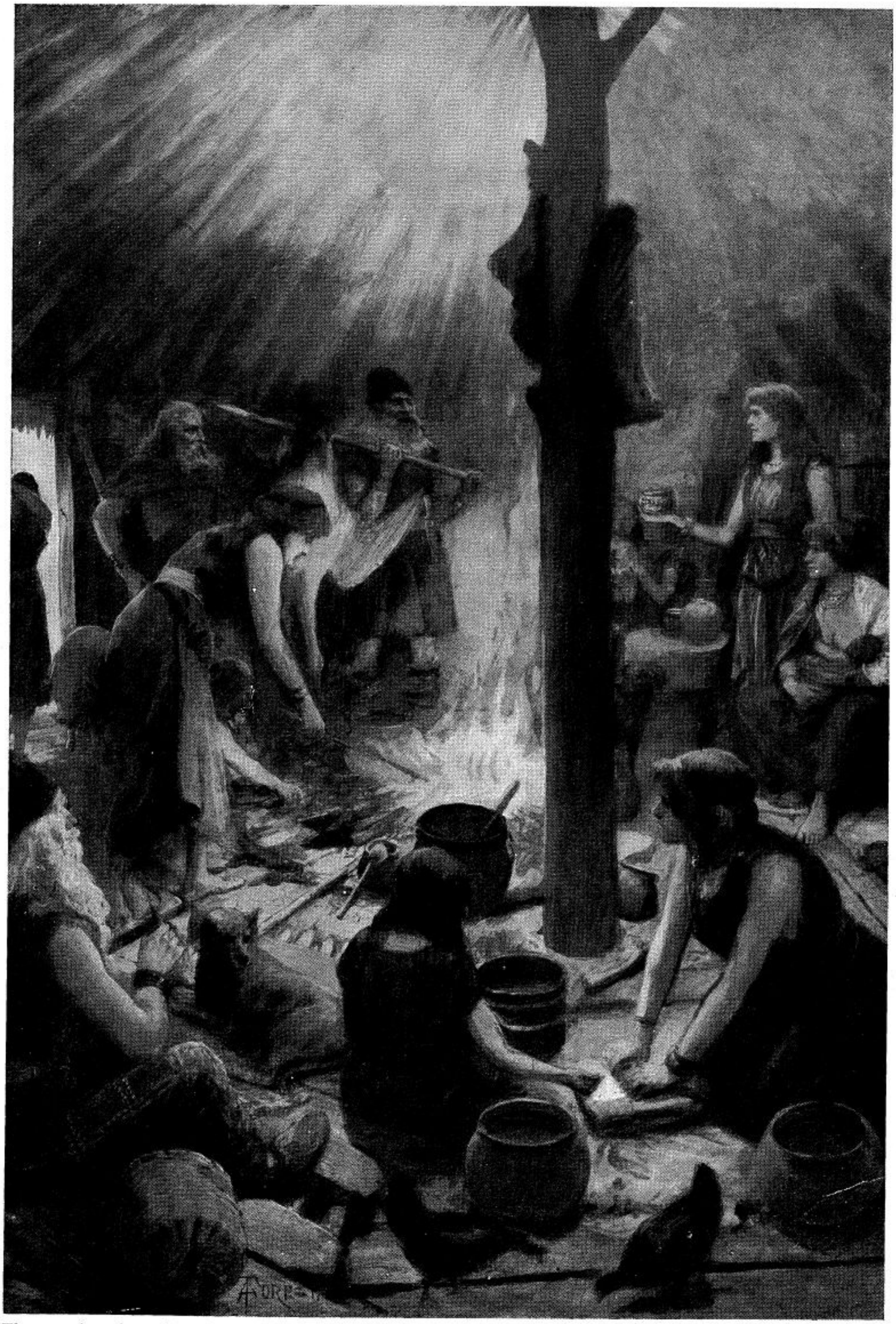
WHO WAS BEHIND ALL THESE THINGS : THE SUN, THE MOON, AND THE WIND?

Calamity had turned the observation of man from the Earth to the sky, and his thoughts from his stomach to the powers behind the universe. Heat and Cold ! Light and Darkness ! The Sun by day and the Moon by night ! The Wind and the Rain ! Who was it managed all these things ? Who made them ?

All religion has its foundation in fear, and all ritual in superstition. Glorious and sublime ideas were to come into the mind of man from religion, but its cradle was fear—a dim feeling in the human mind of powers greater than its own controlling not only the Earth on which man hunted for food, but the sky which changed from light to darkness.

Picture to yourself this changed man on the changed Earth looking at the rising up of the Sun, watching the waves of the ocean breaking on the shore, and listening to the wind roaring through the forests. See what a gigantic change has overtaken him. He is no longer looking for bird or beast ; he is no longer hungry. His mind fastens on the fact that

A BRITISH HOME BEFORE THE ENGLISH CAME



The remains of an old British lake village have been discovered at Glastonbury, and from the things found there an artist has been able to draw this picture, showing the inside of a British home 2000 years ago.

things change. The mighty Sun rises, climbs the sky, and goes down over the sea, taking its heat away with it. The ocean is for ever moving—at times softly, but presently with majestic rage. The wind is gentle now, and now cruel with a suddenness which is terrifying. Why is all this? Who does it?

Speech becomes something more than grunts. Man goes to old grandfathers and asks them who made the world, and why things are always changing. The old men become conscious of a new power. They are no longer regarded as troublesome. They tell the young men stories of the past—of adventures in old huntings, and strange things seen in other lands.

The idea forms itself in the human mind that all round the human race are things which human eyes cannot see. The tremendous division is made between the visible and the invisible, between appearance and reality, between humanity and the gods. Conduct becomes a master thought. How to act, so as not to offend these invisible gods? There is a line of conduct which is *right*, there is another which is *wrong*. Right becomes wisdom, and wrong dangerous. The mind of man addresses itself to this matter. He decides what is wise and what is dangerous. He makes altars, and he also makes laws.

MAN GOES ON LEARNING AND FEELING AND THINKING

Something else is born into the world, destined to merge into superstition and become one of the greatest powers in human life. Man has learned to sow his seeds in the earth, to plant his vines, to catch fish with a spear, to slay some animals with arrows, and to domesticate others. There is no longer the constant dread of hunger. He has time on his hands—those wonderful hands which can never be still. He scratches marks on bones, he shapes flints, he squeezes clay into imitations of living creatures, he carves pictures on stone. Art is born.

One day there comes to his land of plenty a host of men from the distant hills. They are tall, hard, fierce, with the look of eagles. They demand food. There is a quarrel. Blows are struck. Men fall dead. The hillmen retire with anger. They will return in thousands. War is born.

The mind of man is forced into a new channel. Safe from wild animals, he must now make himself safe from the attacks of his fellow-men. That simple mind of his, which had shared with other savage things the perils of forest life, which had learned to get food for its body with little labour, which had discovered how to placate the gods, which was beginning to study the stars, the seasons of the Earth, the movement of waters, and the habits of plants, must now turn its cleverness to a new difficulty. Politics is born.

MEN BEGIN TO WORK TOGETHER FOR THEIR COMMON GOOD

The tribe has hitherto been a body of people living together for safety, a vast hunting party united by the common danger from wild beasts, and also by its habits, its traditions, and its speech. But now something more is necessary. A thing is born in the tribe which takes away individual freedom. Discipline arrives, and Loyalty. One must do this, another must do that, for the good of the tribe. Parties must go together into the hills to spy out what those ferocious hillmen are doing behind their ramparts of stone. Boys must be taught to fight and to kill. Women must make wild music—not to frighten away wild animals, but to terrify the hillmen. New implements must be fashioned, and those who are cleverest at this work must do nothing else. The priests must find out new sacrifices to please the gods, so that the hillmen cannot conquer.

Notice in all this a strange blending of an idea which still governs the human mind—a strong sense of dependence on invisible powers coupled with a vigorous sense of personal self-reliance.

Finally, to part with the savage man, whose work will now merge into the yet unfinished work of civilised man, let us look at his last contribution to the progress of the human race. He builds a town.

TOWNS AND HOUSES TO HIDE IN, AND A WISE MAN OVER ALL

Neither the tree nor the cave can shelter him from those human vultures who swoop down upon his flocks and herds from the pinnacles of rock which pierce the blue sky. He must have ramparts in the valley, and behind those ramparts houses of mud into which his women and children can creep when the arrows fly and stones are whistling through the air. And over the life of this town there must be someone to rule. Who shall be chosen for lord of the town? The mind of man answers without question: He who is wisest.

Preparing the ground for the cotton seed in Egypt

THE FLOWER THAT CLOTHES US ALL

THERE is a little flower which clothes three-quarters of the human race. It is the cotton plant.

Nature fashioned it on the lines of the hollyhock. Its blooms of red, white, or yellow give place to a capsule of seed, the petals fall, the capsule breaks open, and discloses a mass of white, hairy down, and that is the cotton of commerce.

The energies of man are directed, first to enabling Nature to do her best with the plant and bloom; then to separating the down from the seed, then to getting it to the market and the mills, where the little white hairs are twisted and spun into continuous lengths, so providing the raw material from which all cotton goods are made by the weavers.

This important material in the clothing of civilised peoples had run wild for many an age before civilisation began to use it. Cotton was an article of manufacture in India when Alexander marched his army there over twenty centuries ago. It was awaiting white men in America. Columbus found it growing wild when he reached the West Indies; and the conquerors of Mexico marvelled to find the Aztecs arrayed in garments of cotton. Australia is now found to possess the same rich gift of Nature, for in the Northern Territory, where men run unclad, the cotton plant blooms untended by man.

Of course there are many varieties. Cotton which thrives in India fails in America, and the best of American cotton has a struggle for mere existence in India. But, given a warm, humid climate, the cotton plant, of some species or other, flourishes under any sky.

Some of the best cotton grows in the land of the Pharaohs, along the strip of mud which the Nile throws out on each side to make a fertile Egypt. Farther south, away down through Africa, cotton is a native plant. Experience proves that the finest fibre comes from plants grown in lands where there is a long, genial summer, no matter how severe the winter. Great Britain cannot grow cotton; yet, though not a needleful rises from English soil, it is in England that the greatest quantity of manufactured cotton is produced. Every handful of cotton used for our manufactures comes from overseas, and the greater portion of all we make goes out to clothe people in climates warmer than that of the British Isles.

Nothing else that grows has influenced history as cotton has. It brought England from a petty nation into the forefront of manufacturing races. For long the cotton

utilised was spun by hand, and trade in it was insignificant. But Hargreaves with his jenny, Arkwright with his water-frame, Crompton with his mule, Cartwright with his power loom, changed the whole character of the work and the financial position of the country.

Instead of working in cottages in the country, men, women, and children were gathered together in mills. That was the beginning of our factory system, and Lancashire was its centre.

Industries seem at a glance to spring up casually in certain areas and to avoid others without reason ; but there is reason for the geography of cotton and wool and iron. The mills and factories are built on the verge of coal-fields which feed the boilers. But the special fitness of Lancashire is guaranteed by her climate. She lies westward of the Pennine hills, which convert Atlantic winds, heavy with moisture, into rain. Humidity is essential to cotton spinning, and the climate of Lancashire is ideal for this work.

Cotton is the source of our greatest wealth. English goods have rivals now in India, in Japan, and elsewhere, but the finest cotton goods in the world come into existence in Lancashire, which has the biggest output and the best that honest labour and skilful contrivance can furnish.

THE TERRIBLE DAYS OF THE LITTLE COTTON SLAVES OF ENGLAND

Yet there is a sordid chapter to be written in the history of cotton. Our factories, which made us among the wealthiest of nations, became the centre of tyrannous abuses of child labour. No industrial conditions have ever been more terrible than those in which little boys and girls, aged women, and ailing men toiled to found the fortunes of the pioneer manufacturers in Lancashire. They were a callous race, these builders-up of our factory system.

Our Factory Acts are a memorial to those whose hearts were touched by these cruelties, and today, though still far from ideal, a cotton mill is a model to the rest of the world. The health of the workers is now recognised as of equal importance with the profits of the owner of the mill.

But this wonderful product of a flower did not scourge England alone. It led, in the middle of last century, to the greatest war waged for two thousand years. Cotton endangered the liberties of millions of human beings in the Southern States of North America, which in spite of the ravages of the cotton boll weevil, is still the foremost cotton-yielding area in the world.

No Briton has any right to taunt the Southern States with their desire to make slavery permanent, for English ships took the slaves to America. Our ancestors traded in African slaves as their descendants trade in cotton and cattle.

THE AFRICANS WHO WERE STOLEN AND SOLD FOR THE COTTON FIELDS

In the hundred years before the declaration of American Independence we carried to the United States three million stolen men and women, human beings caught like animals in Africa, and sold into bondage. About 300,000 died at sea in our horrible slave ships, and their bodies were flung into the Atlantic.

Gradually public opinion in America turned against this horrible system of slavery. For one thing, it did not pay. The broken-spirited Negroes were found hardly worth their keep in the cotton fields, for they cleaned only a few pounds of cotton a day. Emancipation was ready to be born, when an invention suddenly changed the whole situation.

Eli Whitney evolved a cotton-gin, a machine which automatically separated the cotton fibres from the seeds. At once every slave's value was increased enormously, for, instead of a few pounds, he could now clean a thousand pounds a day.

The cotton-growing States determined to maintain slavery; the non-growing States decided that they should not. The South declared its right to do business in its own way, and decided to break away from the Union; but the North refused to recognise this right.

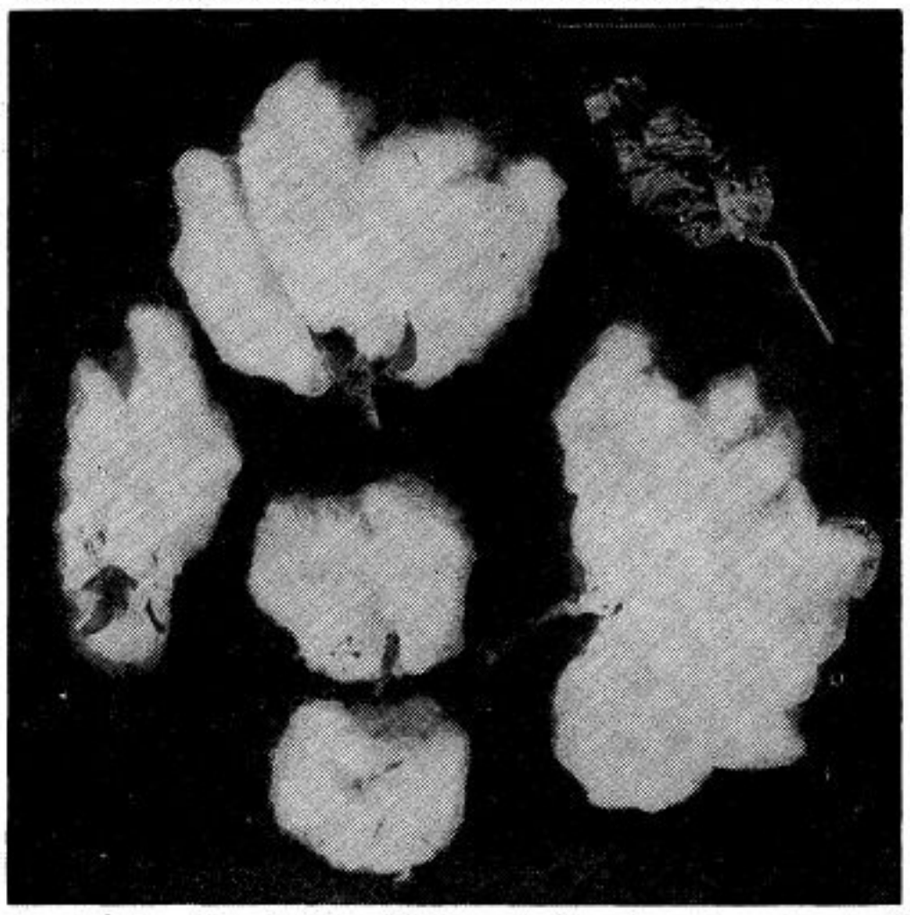
COTTON NOW PICKED BY FREE MEN ALL THE WORLD OVER

So came about the American Civil War. The North fought for the preservation of the Union; the South fought for independence. Those were the battle-cries. But the liberty the South sought was the liberty to keep millions of Negroes in chains. It was a bitter war, lasting four years, causing terrible loss of life and property, and bringing Lancashire to starvation through want of cotton.

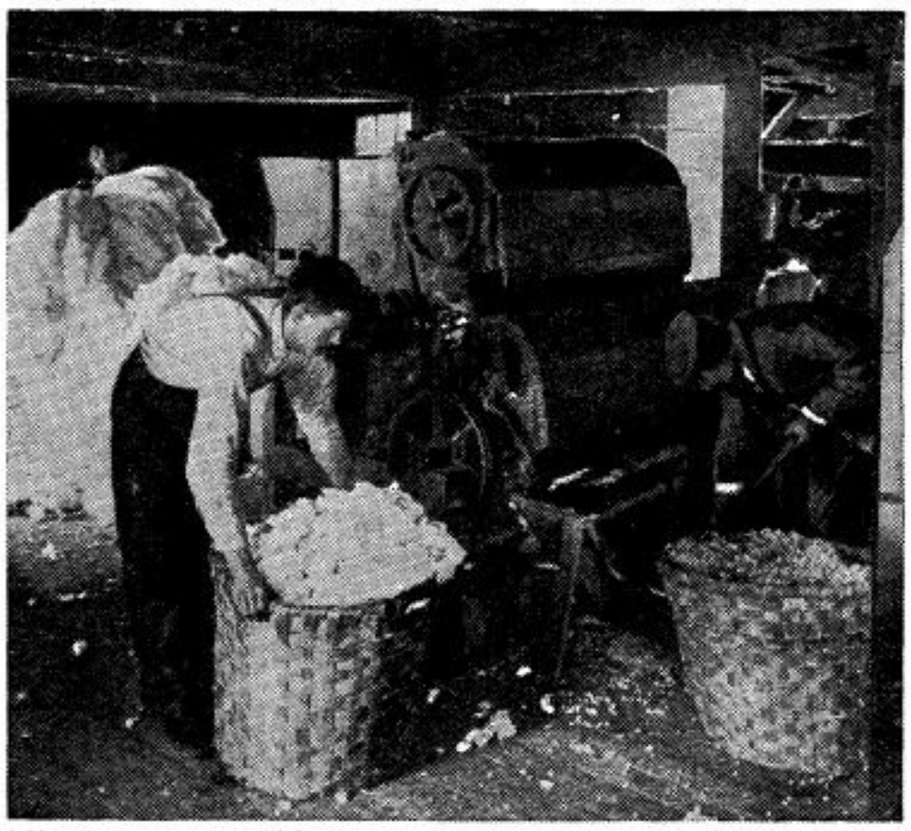
But Abraham Lincoln and the cause of righteousness prevailed. The enemies were reconciled, and today cotton is grown and picked by free men and women in America and all the world over.

COTTON BEGINS ITS GREAT CAREER

The United States produces far more cotton than any other country. Here we see cotton being picked by hand in Georgia. Machinery has been tried for this operation, but it cannot select the ripe bolls.



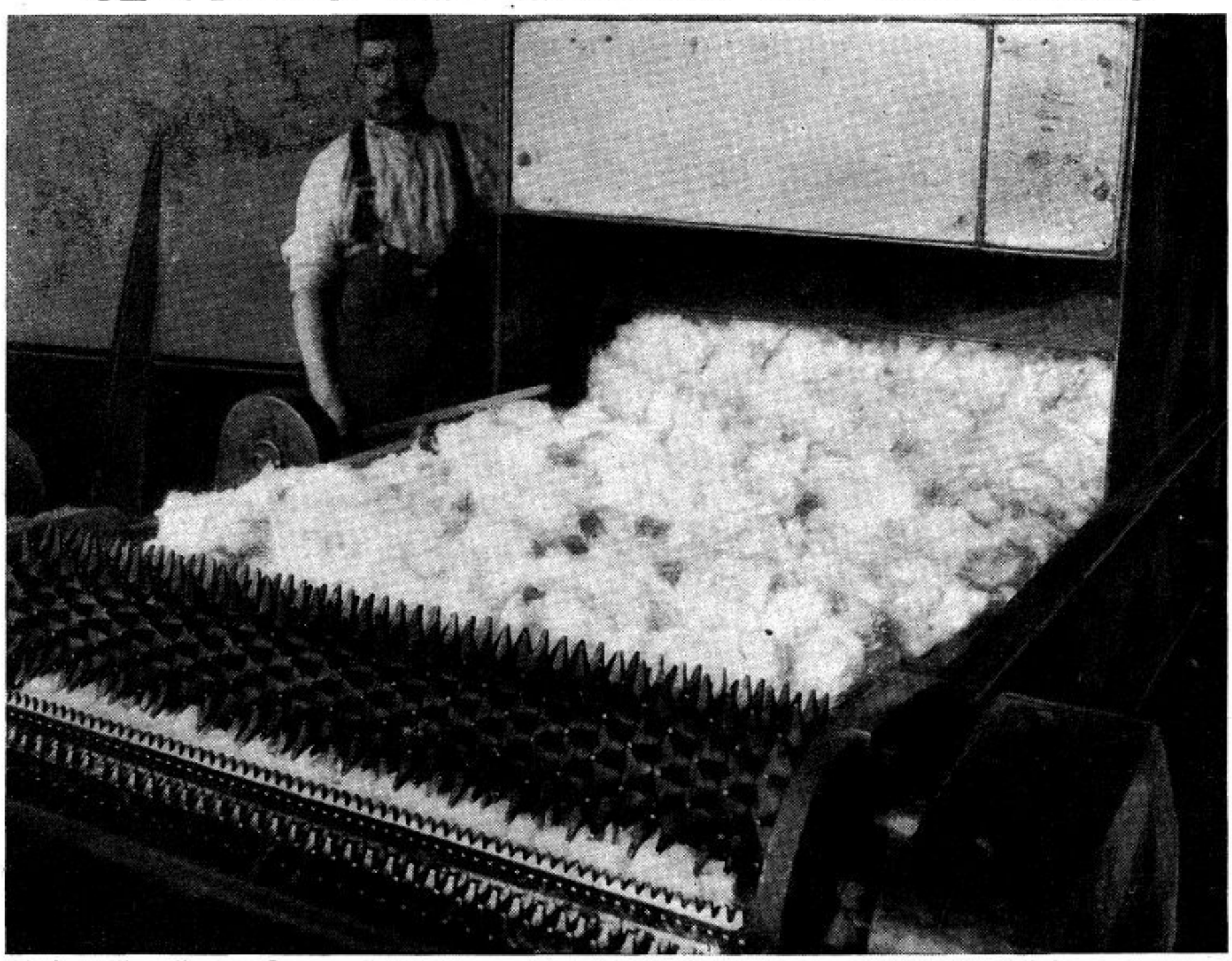
Cotton is a hair covering the seeds. From the flower springs the boll, which, on ripening, bursts and displays the seeds and cotton. The destructive boll weevil pest threatens America's cotton supremacy.



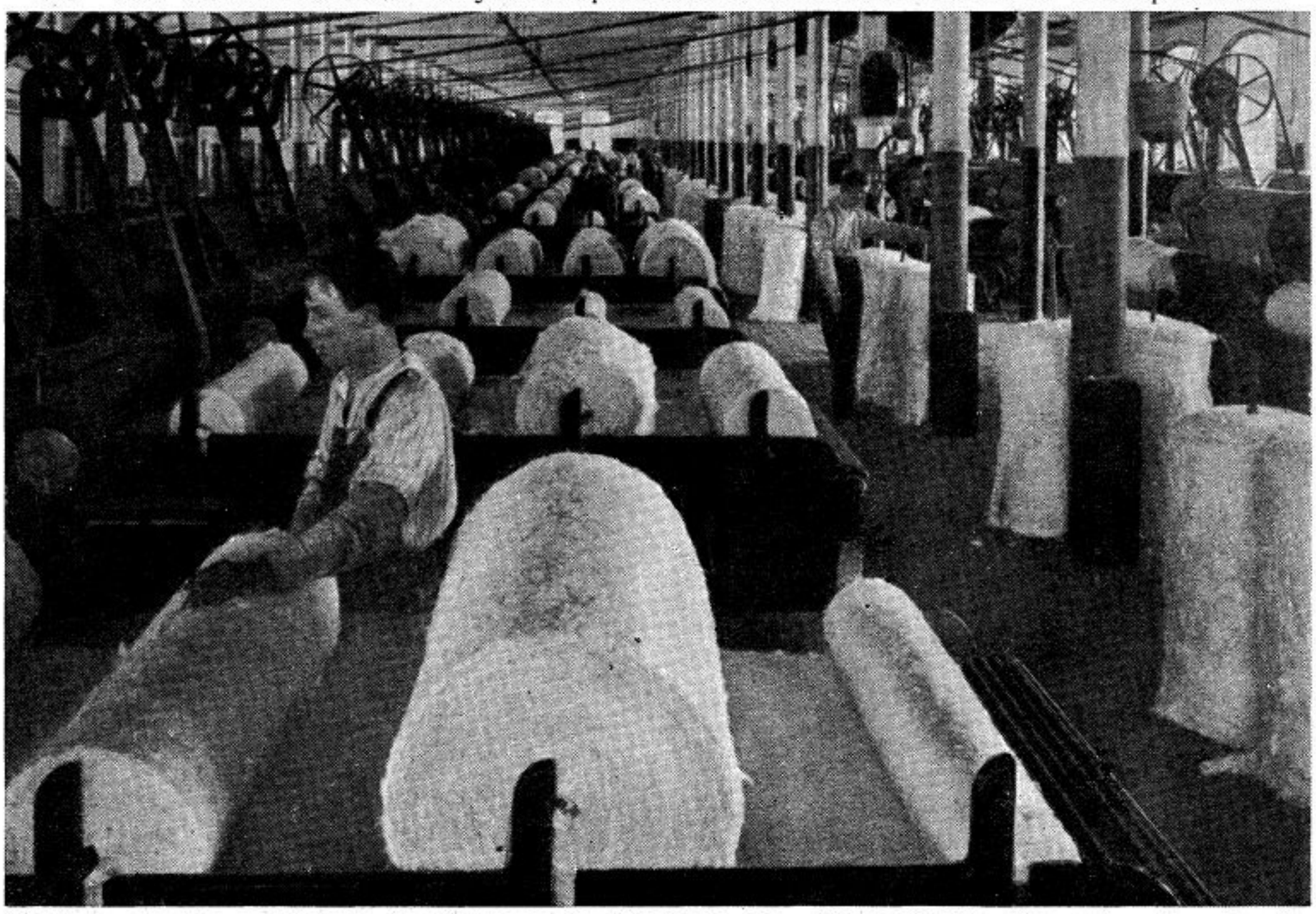
The cotton, or lint, is separated from the seeds in the ginning machine shown here. American cotton yields on an average from 30 to 35 pounds of lint from 100 pounds of seed cotton.

The lint is packed into bales weighing about 500 pounds each, and then compressed for shipment abroad. The seeds are crushed and yield oil for making soap, margarine, and oil-cake for cattle.

CLEANING THE COTTON AT THE MILLS

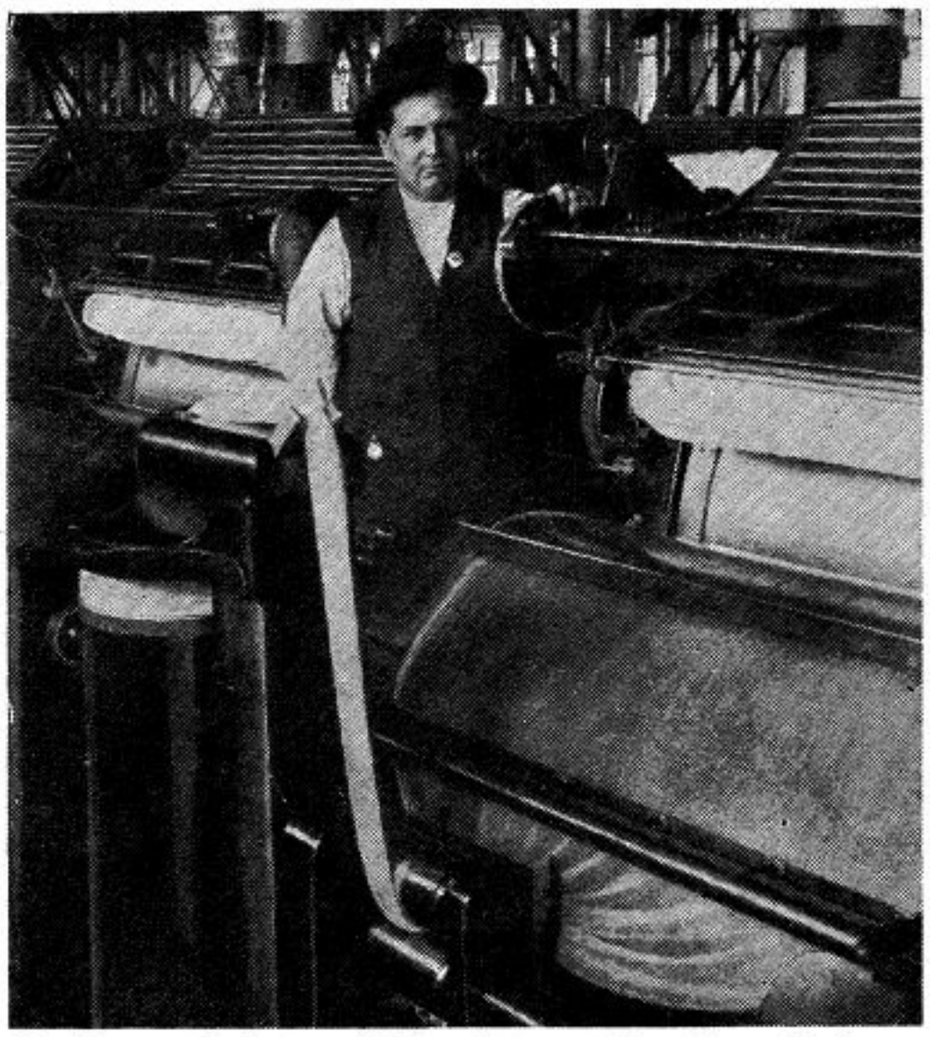


At the mills spiked or fluted rollers tear the matted fibre apart and pass it forward in a flaky stream to an opener-machine which carries on the work of cleaning from the cotton stray seeds, dirt, leaves, and so on. Then the wide stream of fluffy cotton passes under rollers and is wound off in a lap or fleece.

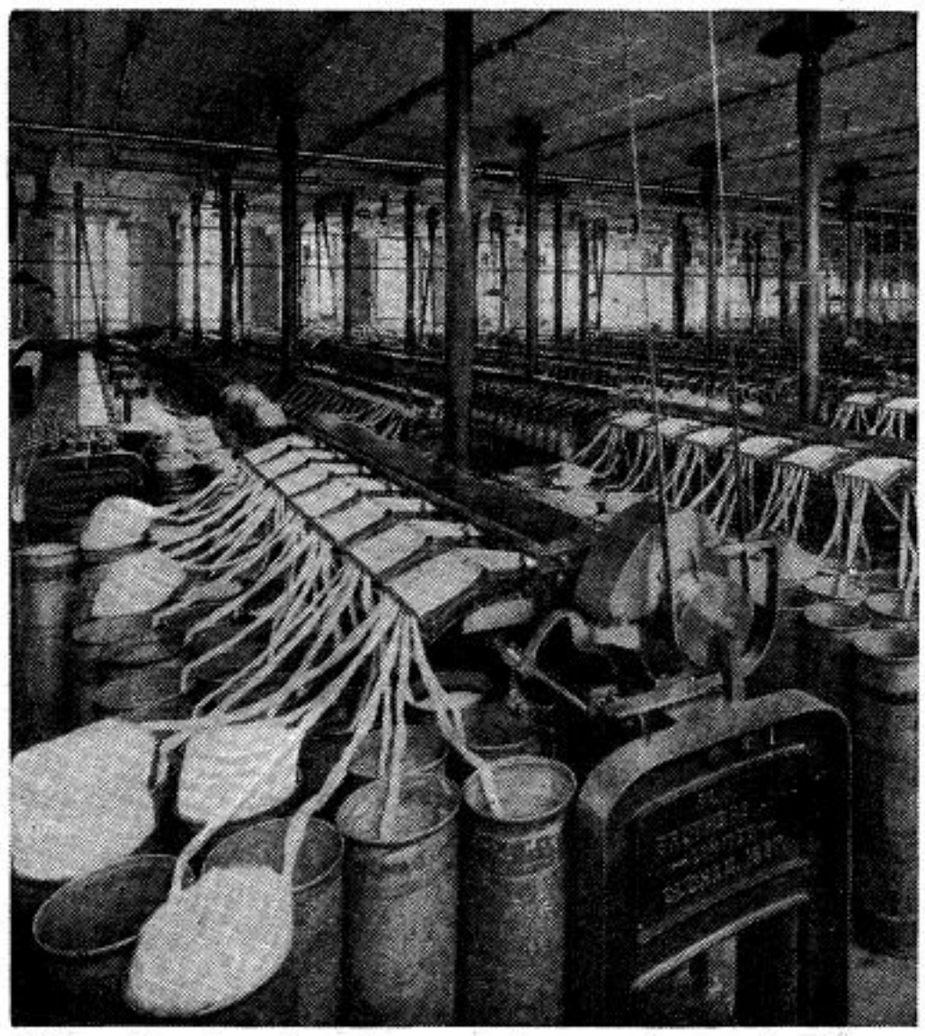


The laps pass into a scutcher where four may be rolled into one. After a final beating and suction-cleaning the condensed, broad, white lap is rolled out. It is now of even thickness and weight throughout every yard.

THE CYLINDER WITH FOUR MILLION TEETH



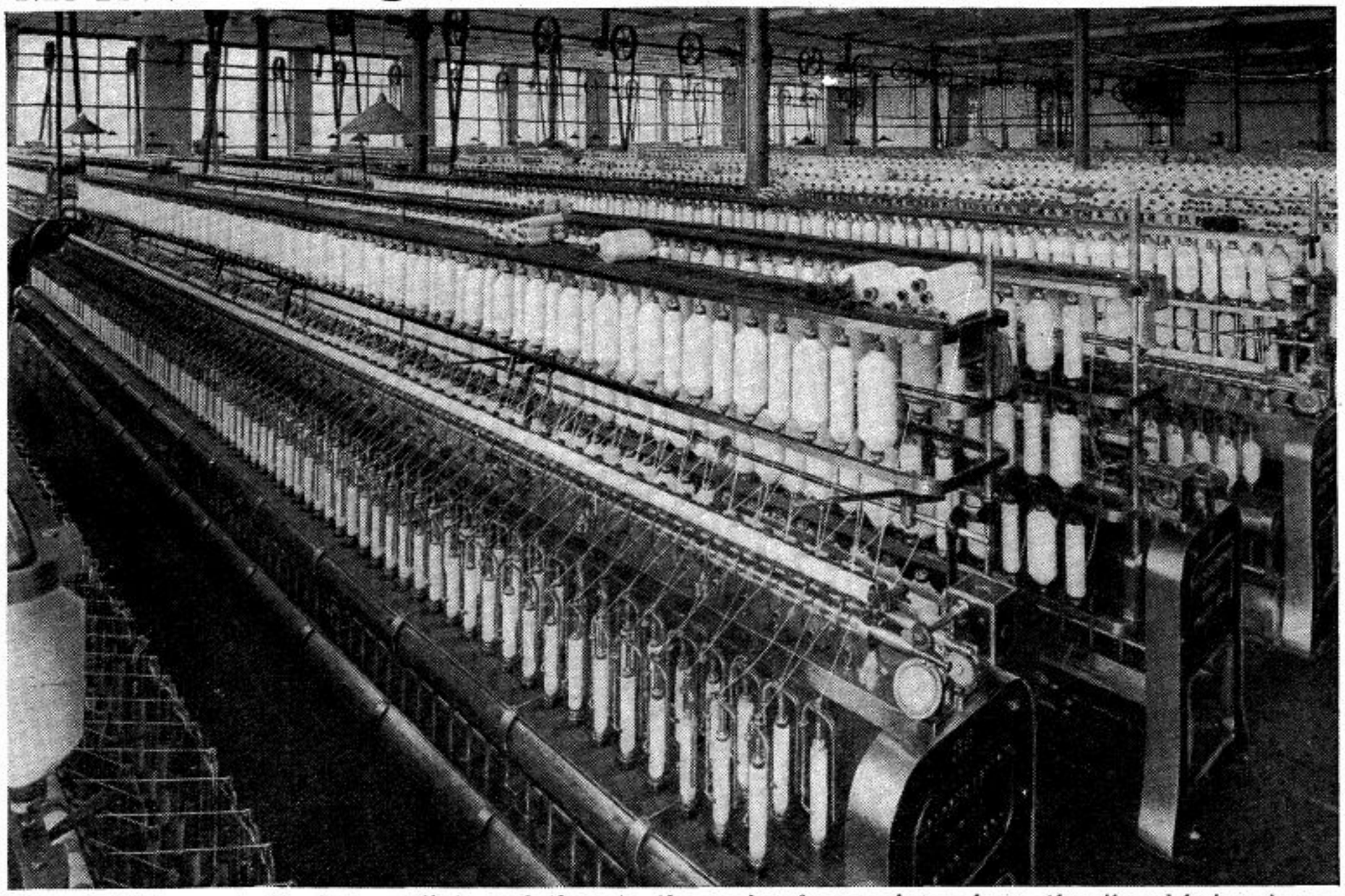
Good yarn is impossible unless carding is well done. On a cylinder 4,000,000 needle-pointed teeth tease out the lap fibres into parallel order, making a fine veil of pure white cotton. This passes through a tube and thus is pressed into a riband or sliver.



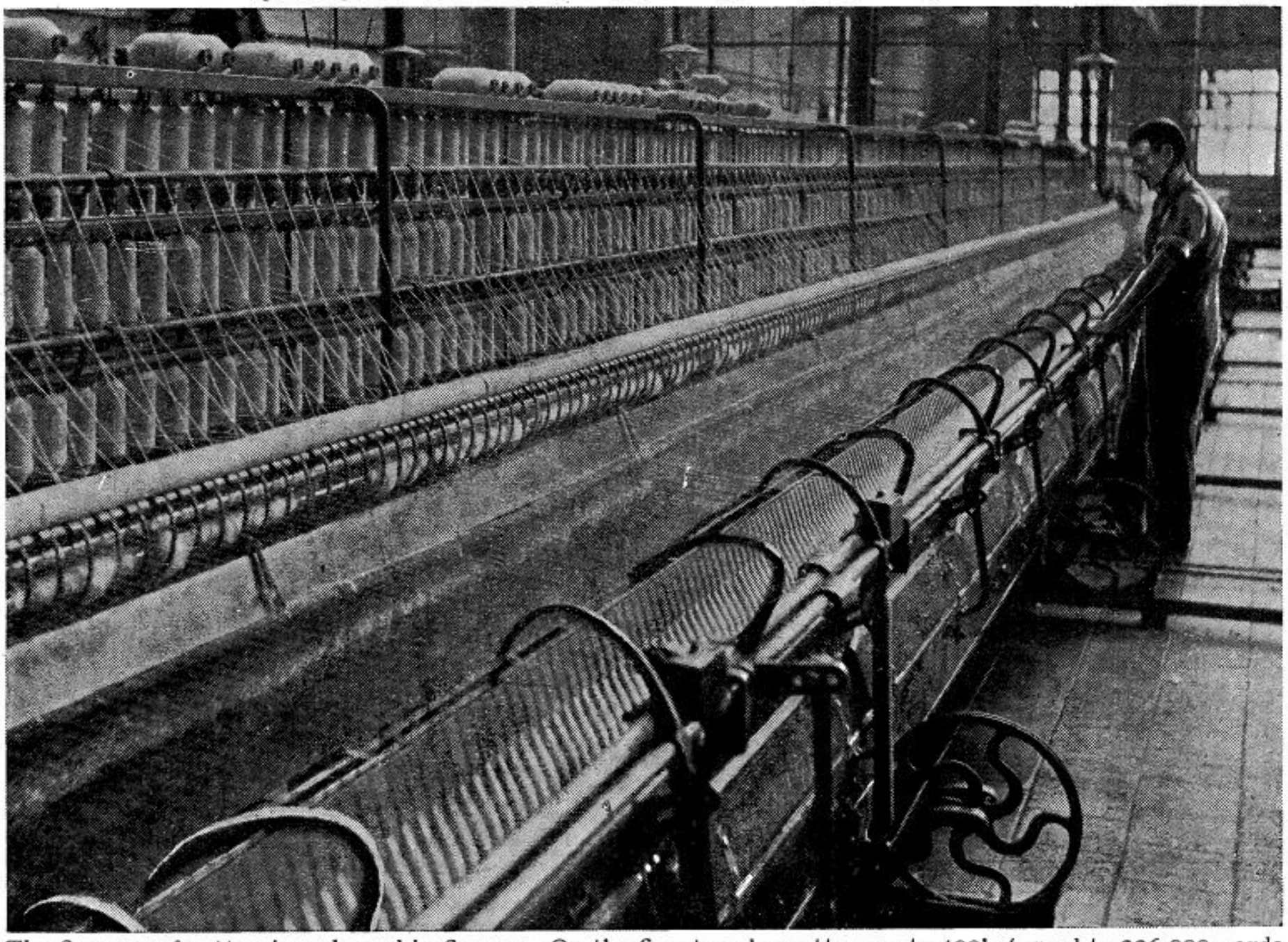
Then the drawing-frame takes perhaps six slivers and rolls them into one, doing this again and again until 216 slivers may be combined into one, every yard uniform in weight and thickness, with its fibres as parallel as human endeavour can make them.

From the drawing-frame the cotton comes in cans to the slubbing frame, and there begins the twisting of the cotton from a thick sliver to a fine thread. Passing between rollers the sliver is gradually drawn out thinner and thinner, being given a slight twist, and then wound on to bobbins.

MARVELLOUS WORK OF THE SPINNING MULE

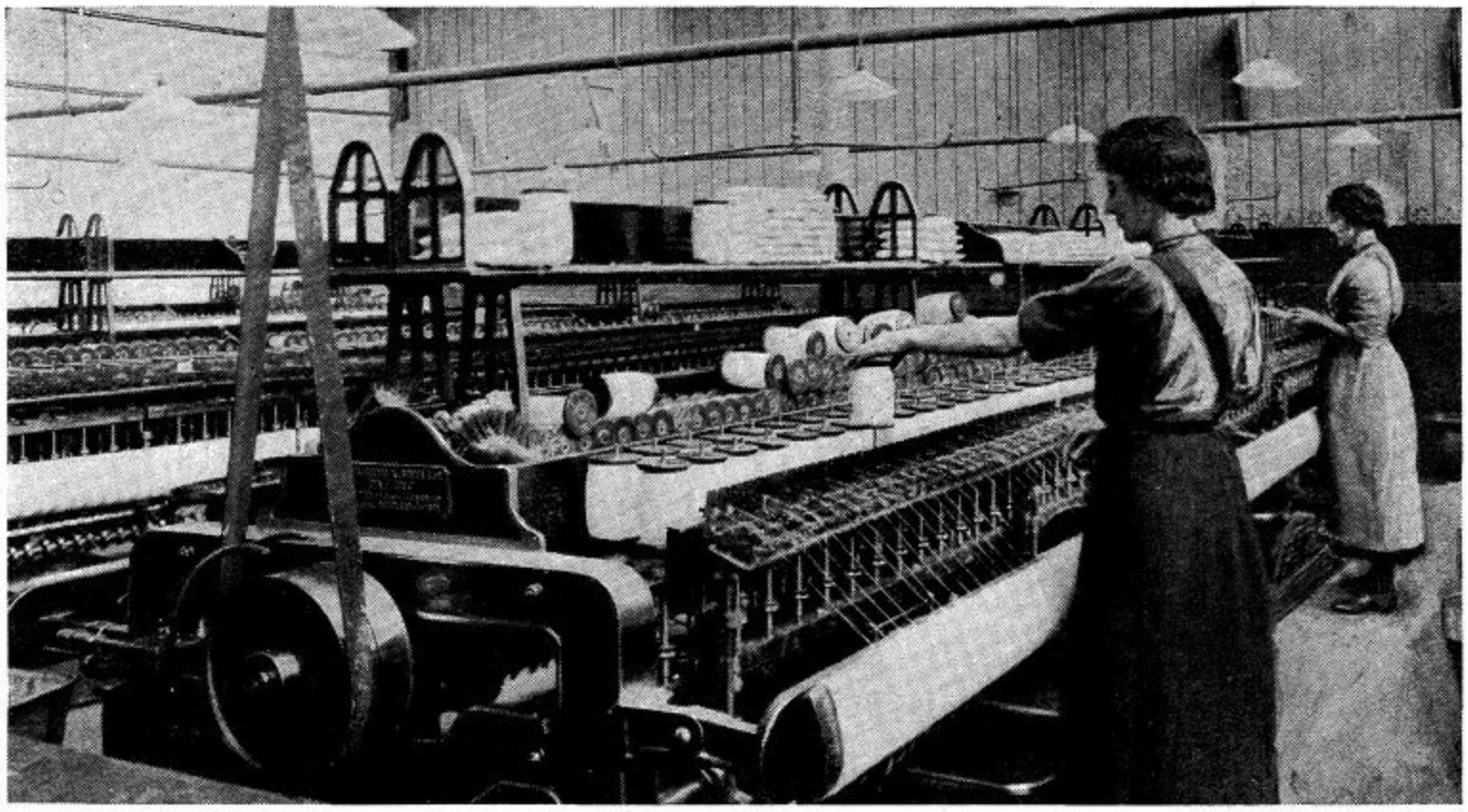


These bobbins go to the intermediate and then to the roving frame, shown here, the riband being drawn out finer and finer and given more twist, finally being wound on to other bobbins. The real process of spinning now begins upon ring-spinning or mule-spinning frames.

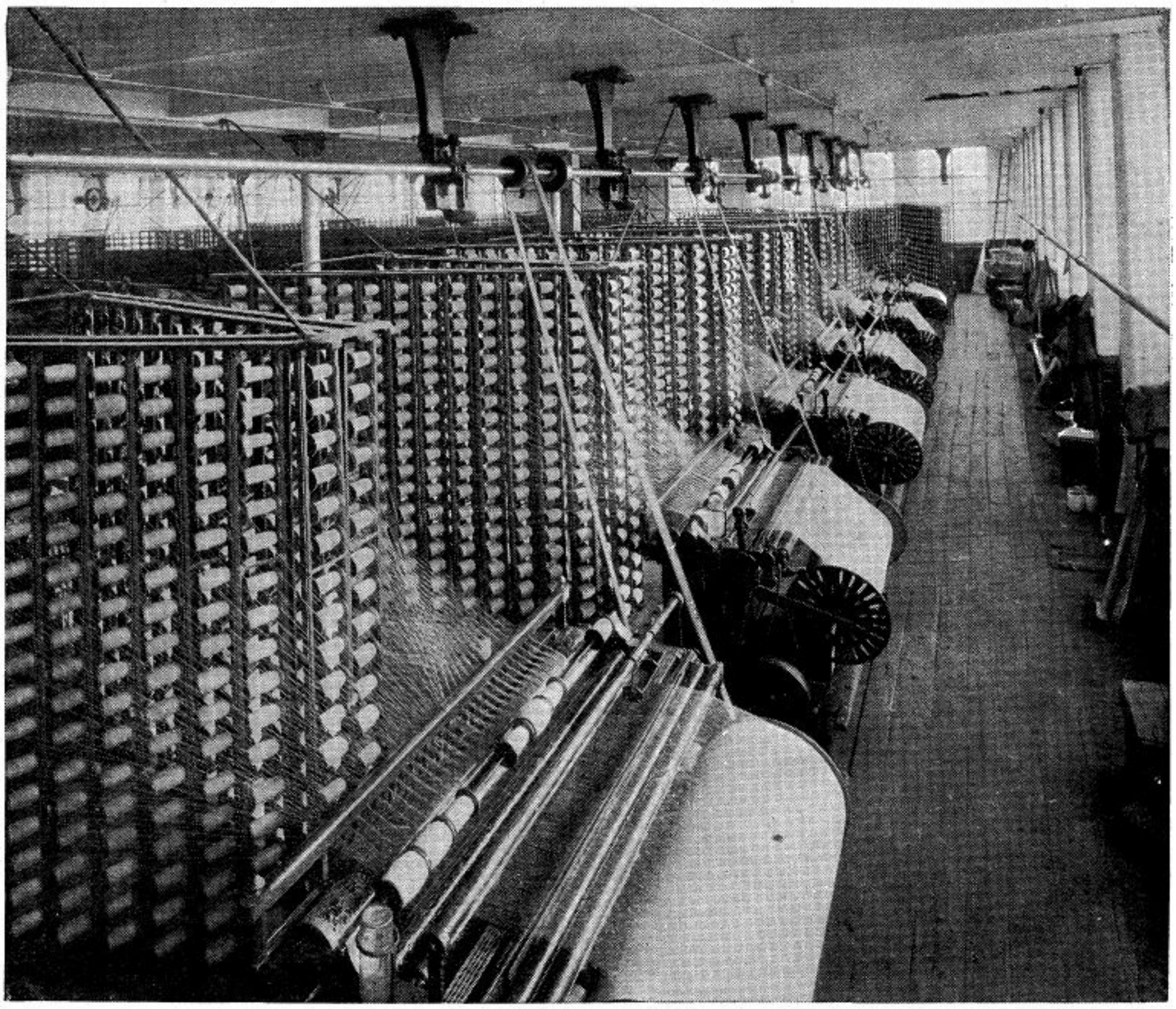


The fineness of cotton is reckoned in figures. On the finest mules cotton up to 400's (equal to 336,000 yards or about 190 miles to the pound) can be spun on to spools, known as cops, without breakages. For experimental purposes a pound of cotton has been spun into 1000 miles of yarn, but cotton used for the finest goods averages about 95 miles a pound. Such is the marvellous work of the mule, which may be 120 feet long and mounted with 1300 spindles, each spinning 64 inches of thread in about 15 seconds.

THE THREAD IS MADE READY FOR WEAVING

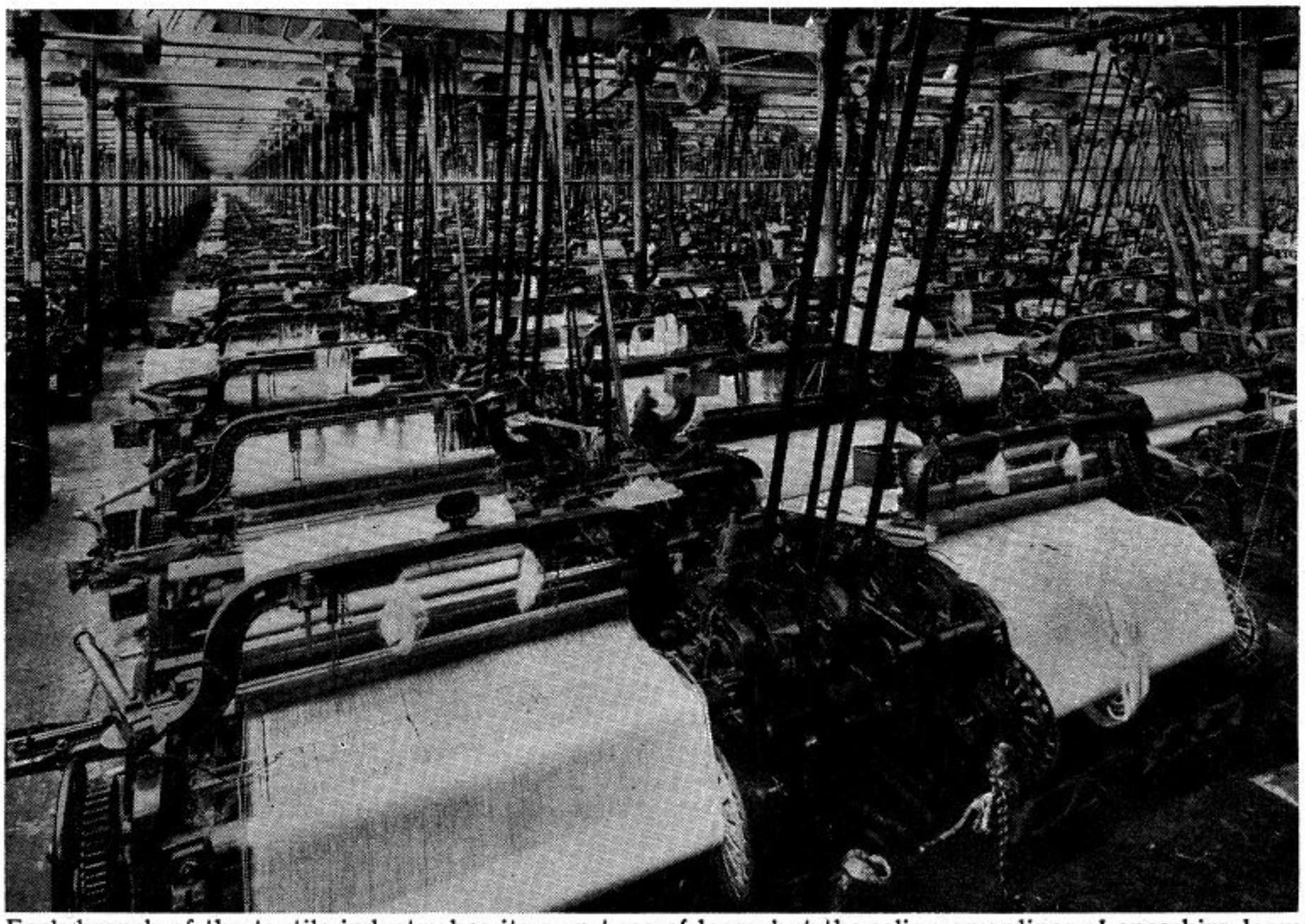


When the thread comes to the weaver the yarn from the spinner is wound from the mule cops on to warping-bobbins. Two or more threads may be twisted or doubled together to make strong thread; gassing or singeing removes loose fibres that would impede its passage through the eye of a needle.

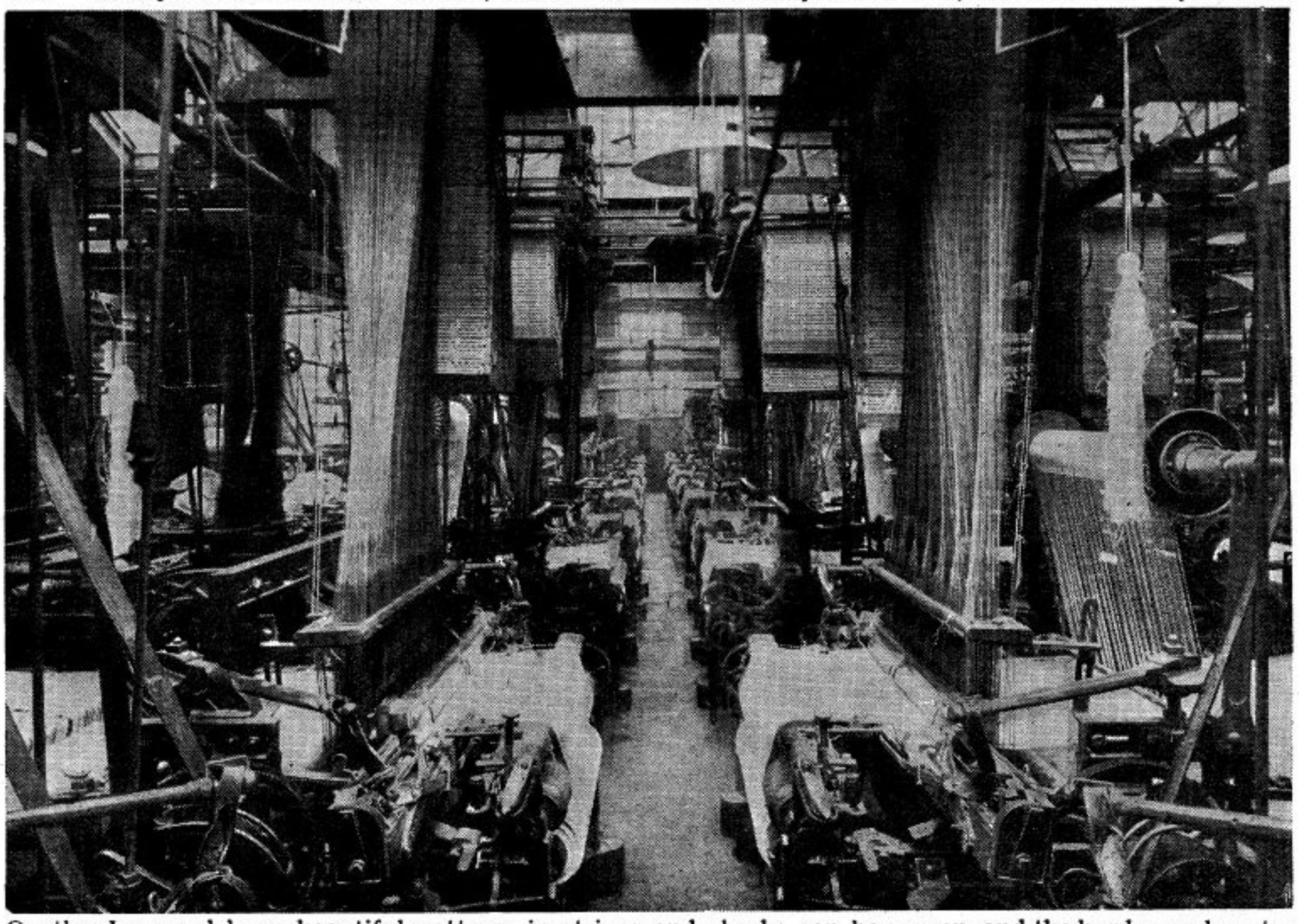


The warp threads to run from end to end of the woven fabric are arranged parallel and with precise length. The number of bobbins necessary to the width of the material are mounted in a frame or creel in a warp-beaming machine and wound on a beam or giant bobbin.

STREETS OF LOOMS IN A WEAVING SHED



Each branch of the textile industry has its own type of loom, but the calico, or ordinary Lancashire, loom is that in widest use. In weaving sheds sometimes thousands of looms are at work together with deafening roar. As dryness weakens the threads, which would break and spoil material, all sheds are kept moist.



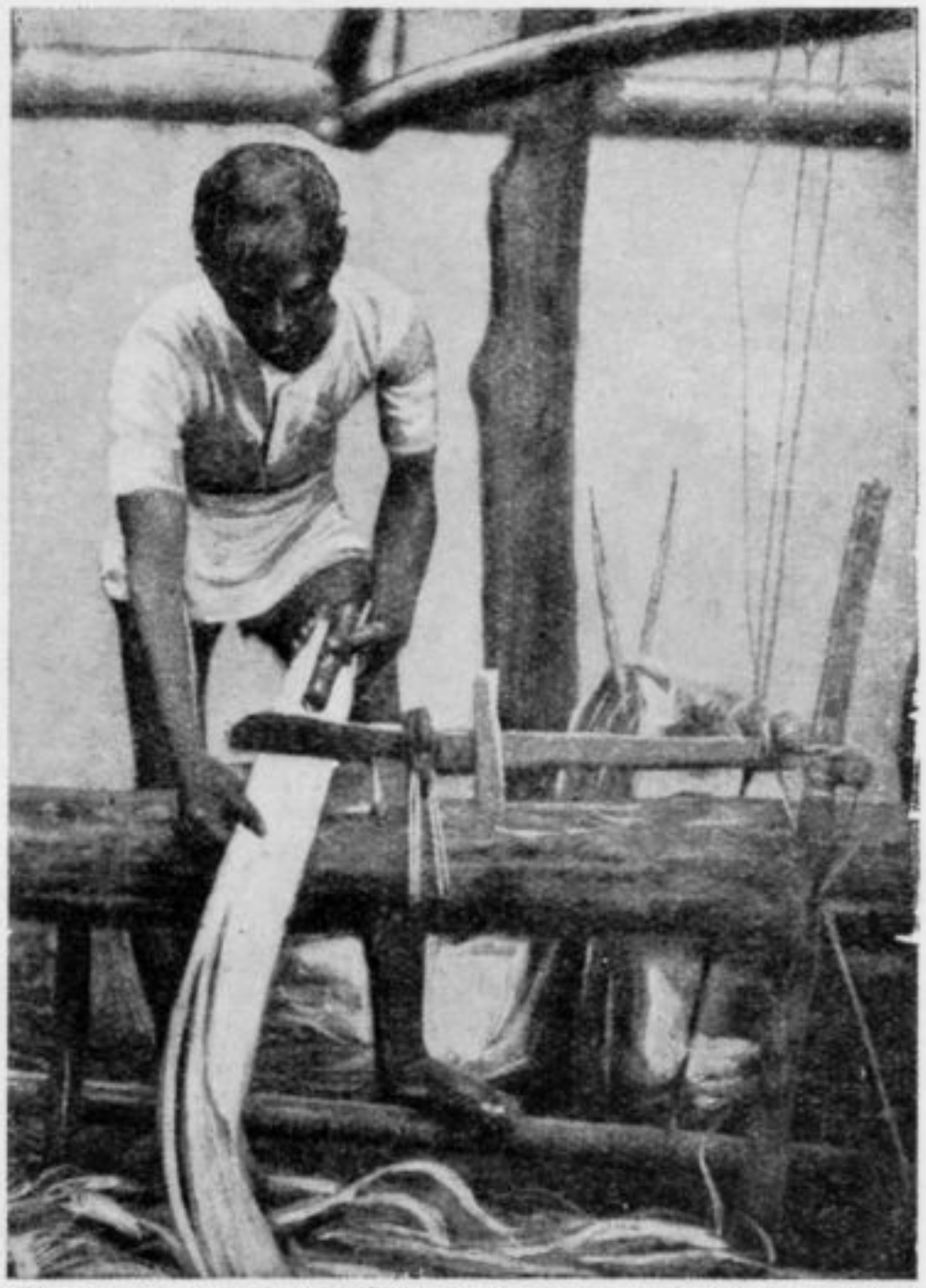
On the Jacquard loom beautiful patterns in stripes and checks can be woven, and the border and centre designs for quilts or tablecloths. The perforated card at the top is punched with holes corresponding to the pattern, and these allow the loom needles to penetrate when so required by the pattern.

Many cotton pictures for the Children's Encyclopedia were taken at Horrockses' Mills at Preston, the finest in the World

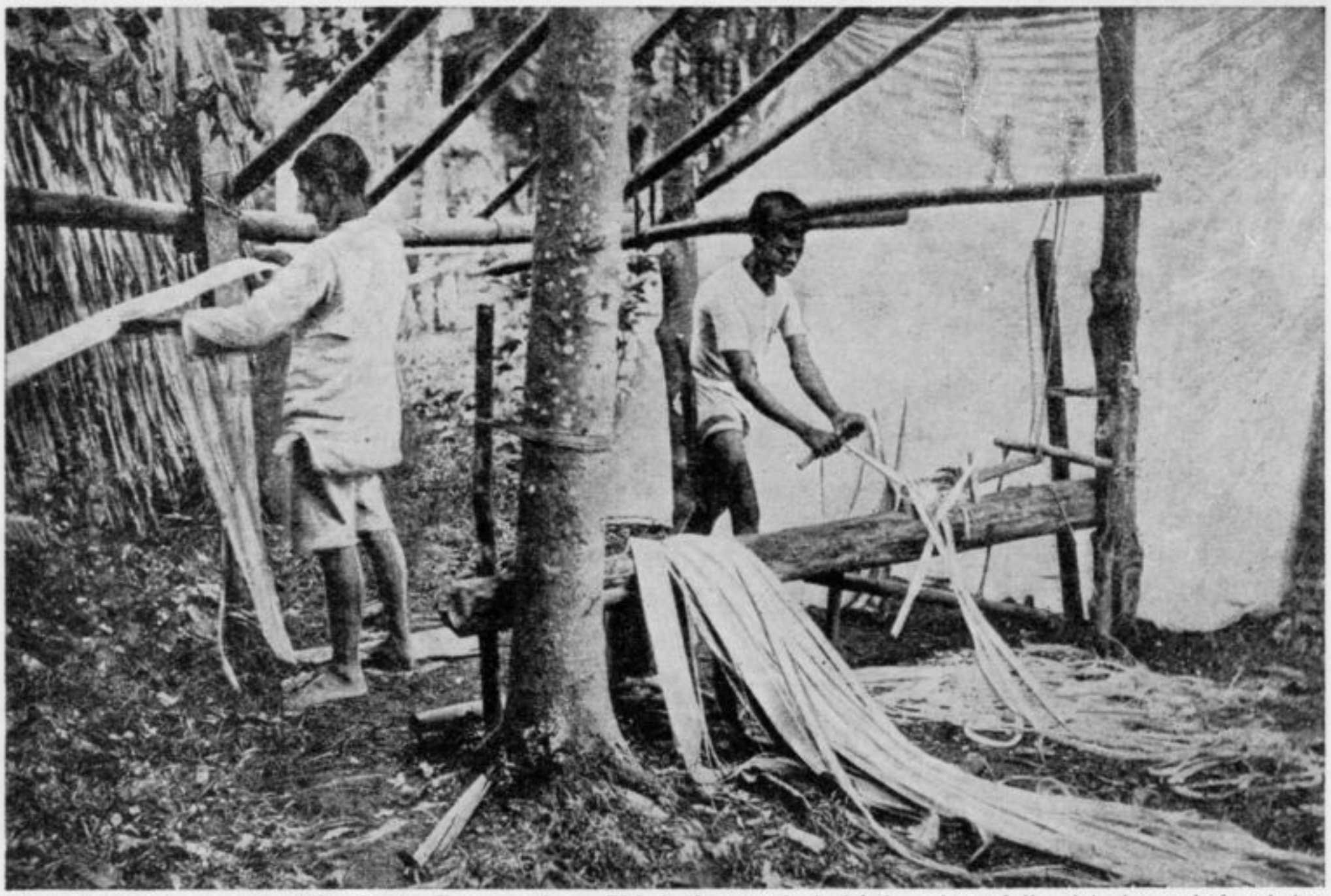
PICTURE STORY OF A PIECE OF ROPE

Here let us see how we get our rope. Sometimes it is made from the husks of the coconut, and there is a very flexible rope made from cotton, but hemp is the material most commonly used.

Manila hemp, made from the leaf-stalks of a plantain growing in the Philippine Islands, is the finest fibre for rope-making. It has great strength and flexibility, and when tarred does not deteriorate in sea-water.



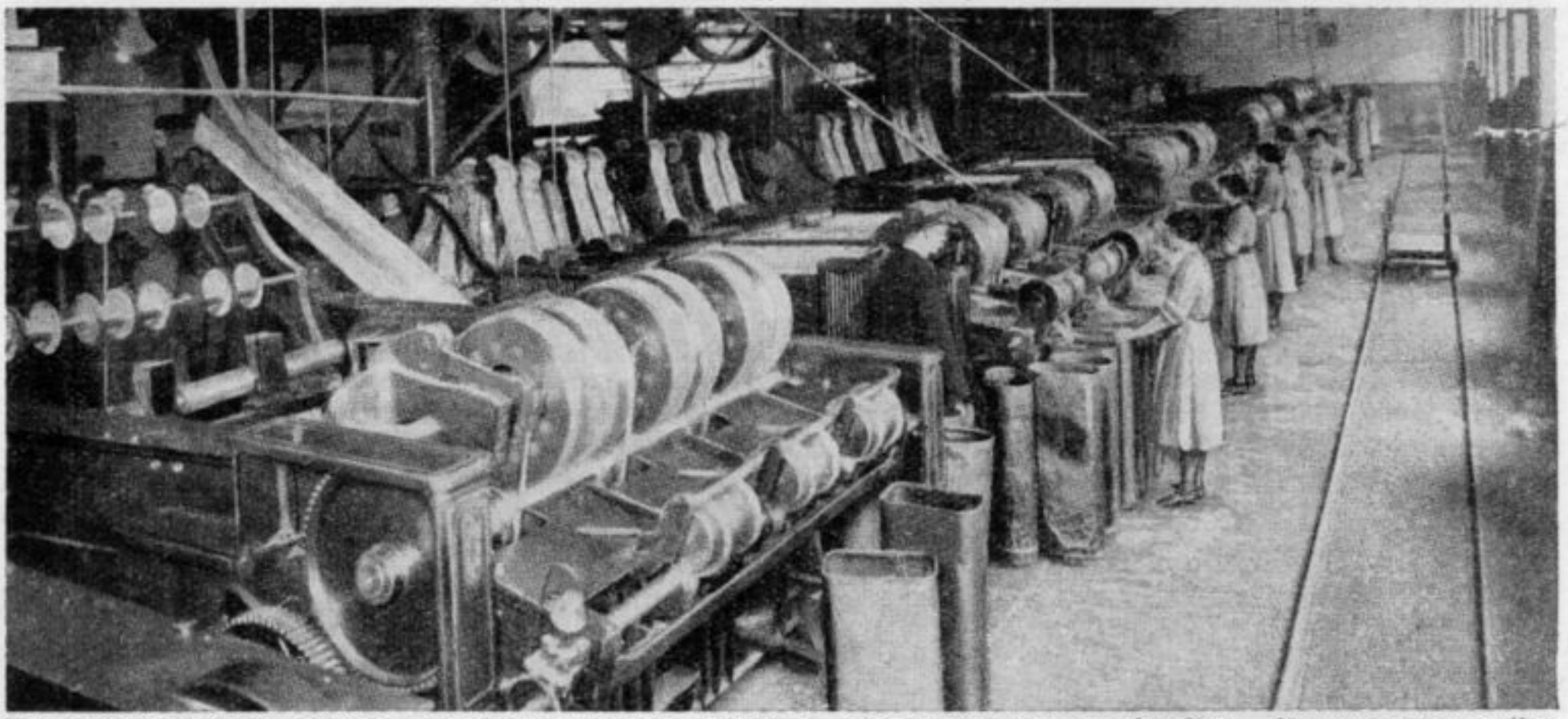
The tree is cut down close to the root and the leaves are cut off. Then the workman, using a bamboo instrument, strips the fibrous coat off the stem, splitting it into lengths each about three inches wide.



These strips are scraped until only the fibre remains. This is then washed, dried, and carefully picked over before being taken to the baling press to be packed for export. It takes two men a day to prepare 25 pounds of hemp, and to produce a ton of hemp the leaves of over 3000 trees are required

MACHINES THAT CLEAN AND SPIN THE FIBRE

Here we see the first process in making a Manila rope in a modern factory. The hemp is taken from the bales and fed by women into a machine called a spreader which spreads it out so that it can easily be dealt with. Each machine can prepare over 10,000 pounds of hemp a day.



The hemp then goes through a combing or hacking machine which straightens out the fibre. It passes over endless chains studded with steel teeth. Finally it passes to the drawing machine, from which it comes out in the form of a sliver or riband which falls into cans and is carried to the spinning machine.

On the hemp spinning-jenny the fibre is spun into yarn. Here we see Russian and Italian hemp being spun. The yarn is spun into strands. A rope is made up of a number of strands twisted together in one direction, each strand having been made from thinner strands having their yarns twisted in the opposite direction. The tendency of the small strands to uncoil one way, and of the larger strands to uncoil the other way, makes the rope cling together firmly.

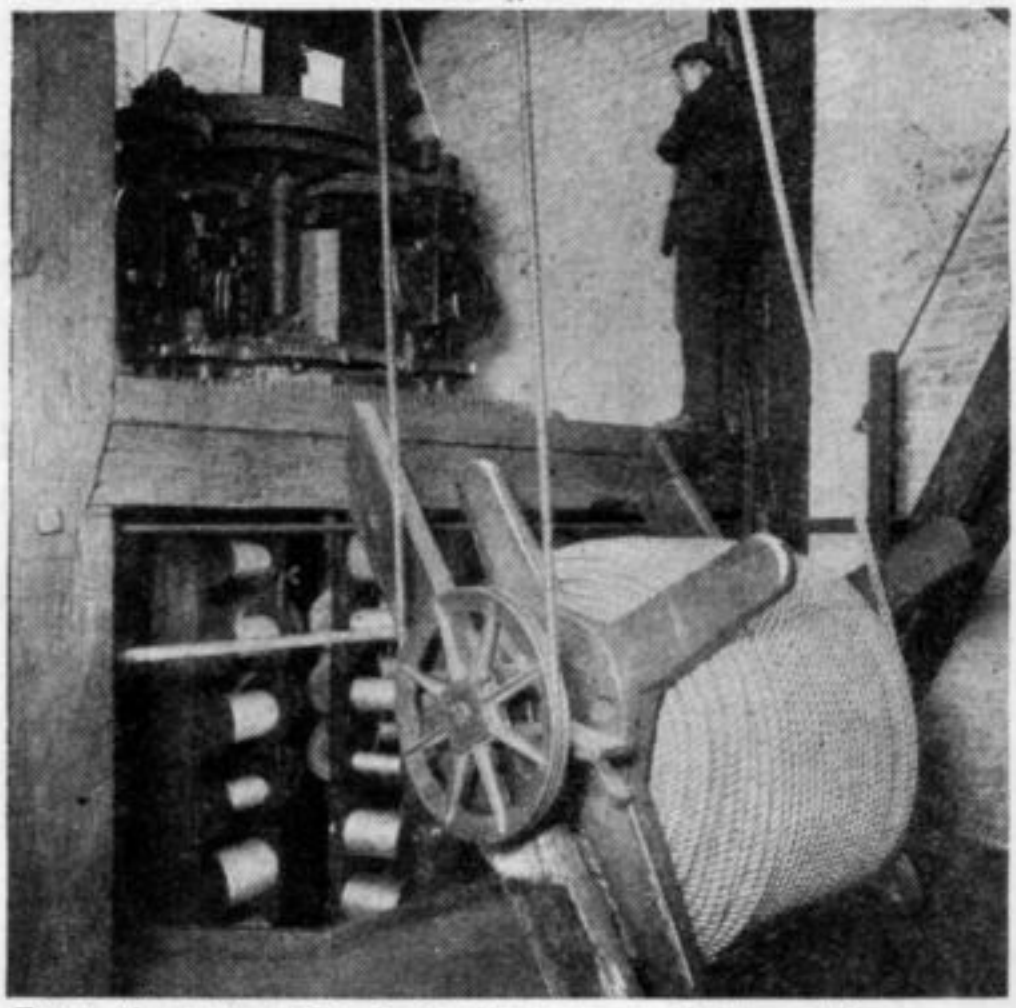
A HUNDRED AND FIFTY SPINNING SPINDLES

The hackling or combing process leaves a large amount of short fibre, known as tow. This tangled mass is treated in a carding machine, which unravels it so that it may be used for spinning. It is then further combed out in a drawing machine, from which it falls into cans in the form of a sliver or loose riband of fibres. It is now ready for the tow-spinning room.

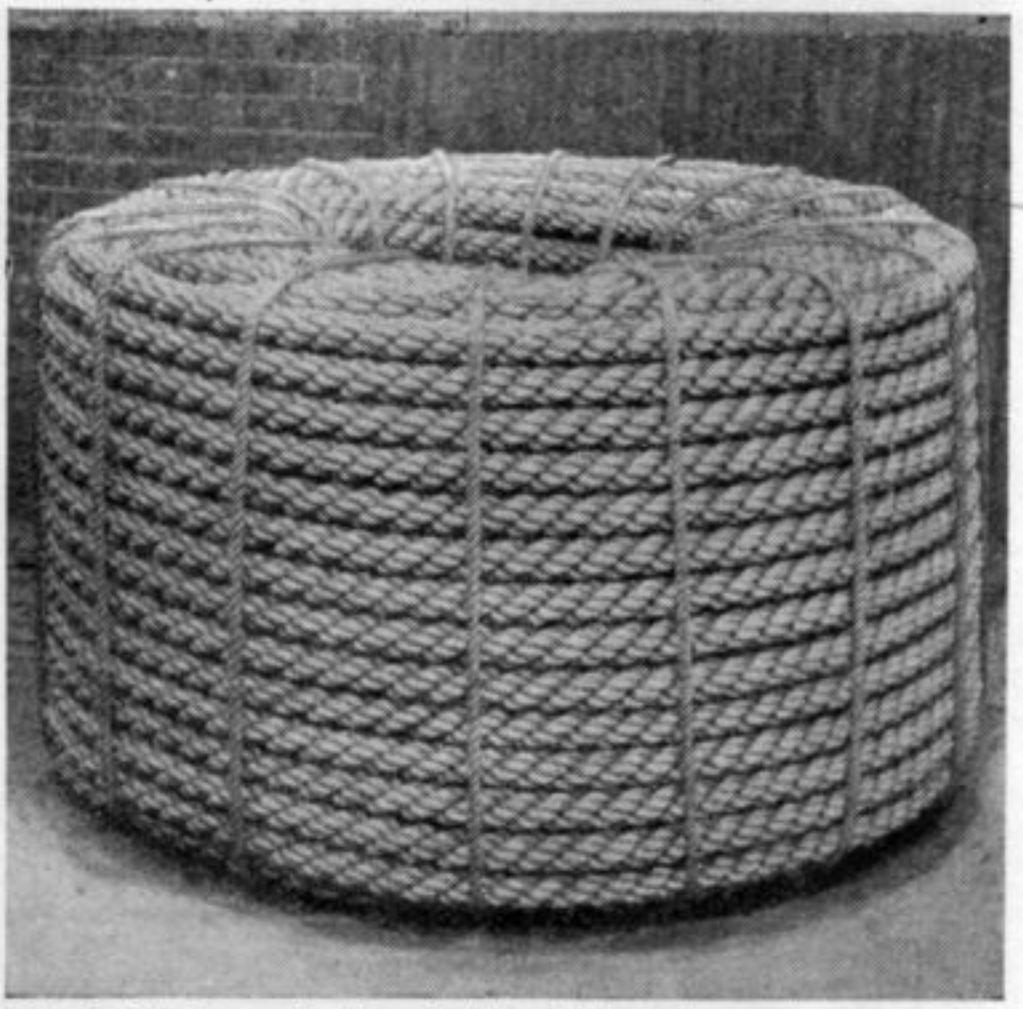
In this room 150 spindles are busy spinning twine for trawl nets. After twines have been twisted, finer qualities of hemp and flax cords are gassed or singed; then they may be dressed or sized and passed into a machine which puts a polish on them like that so noticeable on a ball of string.

A ROPE-WALK OVER A MILE LONG

Here we see the upper end of a modern rope-walk. Elaborate rope-making machinery running on rails takes the place of the men who walked up the alley with the hemp in their hands in the old days. This rope-walk has six alleys, each 1200 feet long—or over a mile in all: and 18 tons of rope can be made on it in a day.



Even these machines have rivals in upright machines over 30 feet high, which twist the rope vertically, and do not take up the valuable space required by a rope-walk.



The finished production in this picture is a rope 1500 feet long and two inches thick, made without a splice. It was twisted on an upright machine like that shown.

The Children's Encyclopedia photographs of rope-making are given by courtesy of British Ropes Limited

Plain Answers to the Questions of the Children of the World

The fire dies down in the cottage. From the Painting by Walter Langley, R.I.

WHY DOES THE FIRE GO OUT?

A FIRE, or anything else that is burning, will go out if the supply of air or oxygen to it is stopped, or if that supply is made so scanty that the burning goes on very slowly, and so does not produce enough heat to keep the coal, or whatever is burning, at the temperature at which it is capable of combining with oxygen; or a fire, or anything else, will go out when there is nothing more left to burn.

When a fire goes out in the ordinary way there is still plenty of burnable stuff left in the grate; and there is still plenty of air in the room, of course; but there is not a good enough draught up the chimney, and the air of the room is not getting to the coal of the fire quickly enough. The air enters the fire almost entirely from below; but perhaps there are many ashes in the grate, choking up the spaces between the bars, and the air cannot get to the coal. So the fire dies of suffocation; it cannot get air. If we clear away the ashes the fire goes on burning.

Almost everyone is puzzled by the two different ways in which a thing may give out heat and light. A thing does this when it is hot; but it may be hot either because it is burning, or for some other reason. The fire is hot *because* it is burning, and that is why it gives out heat and light. The thread in an electric lamp gives out heat and light *because* it is hot, but it is hot not because it is burning, but because it is made hot by electricity passing through it. The Sun gives out heat and light because it is hot, but the Sun is not burning. The Sun is actually so hot that oxygen cannot combine with the other elements in it. The heat that comes from the Sun across nearly a hundred million miles of space is entirely due to other causes.

Similarly, the centre of the Earth is like a fire, it gives out a great quantity of heat; but it is unlike a fire in that it is not burning any more than the Sun is, or the thread in an electric lamp.

We should use the word glowing, and then we can say that the Sun and the inside of the Earth are glowing though they are not burning. The current through an electric lamp makes the thread glow, though it does not burn. A fire and many other things glow when they burn because the burning makes the things so hot that they glow. Any kind of matter that is made hot enough will glow; that is to say, will give out light and heat. The proper way of describing this condition of matter now is to say that it will radiate, or give off rays of light and heat.

What Makes the Wind Whistle?

The howling and whistling and all the other noises made by the wind are not so easily noticed by us when we are out of doors, as when we are in a house. As the moving air forces itself through chinks of doors and windows, or perhaps even down the chimney, and so on, it sets all sorts of things that it meets vibrating or trembling, and so produces all kinds of sounds, and these are often almost musical. Often people are very much frightened by these noises, yet if they went out of doors into the wind itself they would not hear them. The wind passing through the air—that is to say, the current of air passing through the air—does not make itself known to us in sound because what our ears can hear is not a current, but a wave in the air. You cannot hear a draught.

Is There Colour in the Sea?

Land animals and land plants are of all the colours of the rainbow, from the red plant of Arctic snow, to the peacock's gorgeous tail, from the yellow buttercup to the golden humming bird.

In the sea, too, life decks itself in rainbow colours. There we find meadows of green, and blue, and red algae; there we find blue flying fish, rosy sea-anemones, and red coral, and iridescent mackerel. In fact there is hardly a colour on land that cannot be matched in the sea.

But down into the deepest depths of the sea the colour of life goes, as the sunlight goes. More than 3000 feet deep photographic plates bring back impressions, and so violet and ultra-violet rays must penetrate there, though most of the rays of light do not penetrate to half that depth. The Swiss naturalist, Hermann Fol, making investigations in a diving-suit near Nice, noticed that even at a depth of thirty feet red things looked black, showing that the red rays did not reach so far. It is pretty certain that below 1500 or 1700 feet no colour—unless violet—can be seen by the light of the sun; and below that depth all fishes are brown, or black, or violet-black. The last bright colour to disappear is red, and where the red ceases violet-black begins.

Even in the depth of the sea, however, there is light of a kind, for many of the deep sea fishes carry lanterns; at least, they have phosphorescent spots and organs that light up the darkness. One fish of this kind is named the midshipman, because it has a row of luminous spots on it like the gilt buttons of a midshipman.

If a man could go down to the depth of the ocean and look around, he would find himself in a darkness lit only as by stars, and by the light of the stars he would see only violet and black fishes. Besides fishes there are numerous sea creatures, such as squids and bacteria which are luminous, so that the depths of the sea are never without some light.

Why Cannot Fishes Live on Land?

The answer to this is curious. Every living thing must have air or die. The fish comes out of the water, where there is very little air, into the air itself, and there it dies for lack of air. It is drowned on land for lack of air, and dies of what is called suffocation, just as you or I would be drowned in the water.

But why cannot the fish help itself to the air around it when it is put on earth? Why should it starve in the midst of plenty, like a rich man who has something the matter inside him? The reason is that in order to breathe air you must have lungs, or something like lungs, and the fish has none; while in order to get the air which is dissolved in water, which the fish does, you must have something quite different from lungs, which are called gills. The fish has no lungs, but only gills. We have no gills, but only lungs. Therefore, we die in the water and the fish dies out of it. If an animal had both gills and lungs, then it would be able to get air from the air or to get the air which is in the water, as it pleased; and it could live both on the land and in the sea.

Can a Fish See and Hear Us?

If we go to an aquarium, or to the fish-houses at the Zoo, we shall see for ourselves that fishes can see us, and see very well and quickly, too. Every fisherman knows this. He knows, too, that fish are very particular about colour, and that they catch things by sight as well as by smell; for a fisherman's flies are not scented, but coloured, and the fish come to them very readily if they are of the right kind. Then we all know that fishes have eyes, for we have all seen them, and they are quite highly developed eyes. But fishes are decidedly inferior to us in hearing; though they are by no means deaf, they do not respond to music as they seem to respond to colour.

MARVELLOUS COLOUR OF THE SEA

Very few of the fishes in these pages have popular names, and the long Latin names, intelligible only to a few people, are not given. The fishes are chosen as among the best examples of colour in the sea, and their gorgeous colouring is part of the idea of mimicry that runs through Nature—the idea of making creatures invisible to their enemies or attractive or terrifying to their mates.

FISHES SWIMMING IN FOREIGN SEAS

DAZZLING COLOURS OF THE TENANTS OF THE WATERS

LIVING COLOURS IN THE OCEAN

What is the Loofah We Use in the Bath?

The loofah looks like a stiff, fibrous piece of netting, and because it is tough, not brittle, it makes a capital thing to use for a good brisk rub when we are bathing. But it is not made by hands. It is the fruit of a plant, and belongs to the same family as the cucumber. The cucumber is not fibrous, or we could not eat it, and the loofah, or luffa, differs from it in this respect.

Of course the loofah is not, in its natural state, like the loofah of the bathroom. The loofah that we use is simply the fibrous skeleton of the cucumber, or gourd, that grew in Egypt. After the fruit has ripened it is dried, and the fleshy part disappears, leaving only the fibres, and these are so strong, and stand the action of water so well, that a loofah lasts quite a long time. There are about ten species of loofah, and one sort, grown in the West Indies, is used as a sponge.

Why Do We Cook Our Food?

There are many good reasons why we should cook certain kinds of food. Perhaps the best is that cooking makes it softer and loosens it, so as to help our teeth. This is especially true in the case of meat.

Another good reason for cooking food is that the cooking kills any microbes which may be in it, and some of which might do us a great deal of harm. It is certainly much better to boil, or cook, our milk, unless we are very sure where it comes from, and a great deal of the food that we eat now, especially people in cities, would certainly hurt us, by means of the microbes in it, if it were not cooked.

A third reason why we cook food is in order to make it look nice. This is especially true of meat. We have grown to dislike the look of red meat, and we prefer it cooked, so that the red colour of the blood in it is changed.

Why Have We Lines on Our Hands?

Some people have said that the use of these lines is to give us a better hold on things, but probably that is not their real use. If it were so we should really have to say that they were scarcely worth having. It is much more likely that the use of these lines is to help the sense of touch in our hands and fingers, where touch is so very important. By making little valleys and ridges they increase the surface of the skin, and by going in different directions they help us to feel the kind of surface that anything has which we touch. The little endings of the nerves of touch are placed to the greatest advantage by means of these lines, and that seems to be the reason why they are so very well marked on just those parts of the skin where delicacy of touch is most important. It is nonsense, of course, to say that our characters can be read from these lines. The crease in a man's trousers shows much more of his character than the creases in his hands.

Why Does Not Oil Mix with Water?

When two lots of liquid, added together, mix perfectly, it is because the molecules that make up the one liquid are just as ready to link on with the molecules of the other liquid as with each other. The most perfect case is, of course, when the two liquids are the same, as when water is added to water, and the next most perfect case is where the liquids are very similar, so far as the linkage of their molecules is concerned, as when water and alcohol are mixed. But when oil and water are added to each other, we have two liquids which are made of very different kinds of molecules. The molecules of water are very small, and those of oil are enormous—made of great numbers of atoms, instead of only three apiece, as water is. And the large molecules of oil find it very much more natural and easy to link with each other than with the molecules of water, and the molecules of water find it very much more natural and easy to link with each other than with the molecules of oil, so that, as a visible result of these invisible causes, the oil and the water keep apart.

What Does Eureka Mean?

This famous word means "I have found it," and the story goes that it was used by one of the greatest philosophers of antiquity, Archimedes, who lived in the city of Syracuse, in Sicily. The king's crown had been in the hands of the goldsmith, who was suspected of having replaced some of the gold by some other metal; and Archimedes was set the task of finding whether this was so. He did it by putting the crown into his bath, and noticing how much the water rose; and he is said to have run out into the streets shouting "Eureka! Eureka!"

And now, when we have found out something we have been searching for, we sometimes repeat his famous exclamation.

Why is a Raindrop Round?

Why does the rain form drops at all ? We know now that there is always something which we may call a speck of solid stuff in the inside of a raindrop, and when the drop was made it was made by the water-gas or water-vapour in the air turning liquid upon this solid speck, as steam from boiling water turns liquid on a cold plate held above it.

But you want to know why, when it is formed, a raindrop is so nearly round. The answer is the same as the answer to the question why water forms in round drops on a plate, and the question why it runs in drops down the window-pane when it rains. When water turns liquid it really consists of a kind of crowd of tiny parts, each of which is itself a part, or particle, as we say, of water, just as a human crowd is made of men and women.

Now, these little particles of water behave rather as a crowd might behave, if all the men and women making it were to catch hold of each other's hands, so that they were all joined together. If they all held on to each other as tightly as they could, and especially if all the people on the outside of the crowd held each other's hands so as to make a ring, then that crowd would be something like the crowd of particles of water that make up a drop of water. They all prefer to hold on to each other, and stick together, and that is why the drop is formed.

Why Does a Bee Sting?

The use of the bee's sting is exactly the same, in its own way, as the use of the nettle's stinging hairs. The sting is really a fine, sharp, barbed tube, through which a drop of poisonous stuff can be sent when the bee stings. It is the worker-bees that sting—those that do the work of the hive. The case of wasps is the same.

Usually bees or wasps sting only once, for the barb, which is such a nuisance to us when we are stung, prevents the sting from being quickly withdrawn. What generally happens is that a person stung instantly knocks the offending insect away, tearing the sting from its body before the wasp or bee has time to withdraw it naturally ; and the insect is so injured that it dies. Thus it is true to say that a wasp or a bee *can* sting as often as we let it, but in practice we stop it by dragging out its sting and so killing it.

The stings of bees and wasps were not originally weapons of warfare. Originally they were ovipositors, or instruments connected with the laying of eggs ; and only in the course of time have they become poison needles. Indeed, there are some bees in which the apparatus is quite useless for stinging purposes.

Only very rarely do bees attack anyone unless they have received provocation. As a rule, they sting only when people try to kill them or drive them away, when they get alarmed and use in self-defence the weapons Nature has given them.

What Holds the Stars in Their Place?

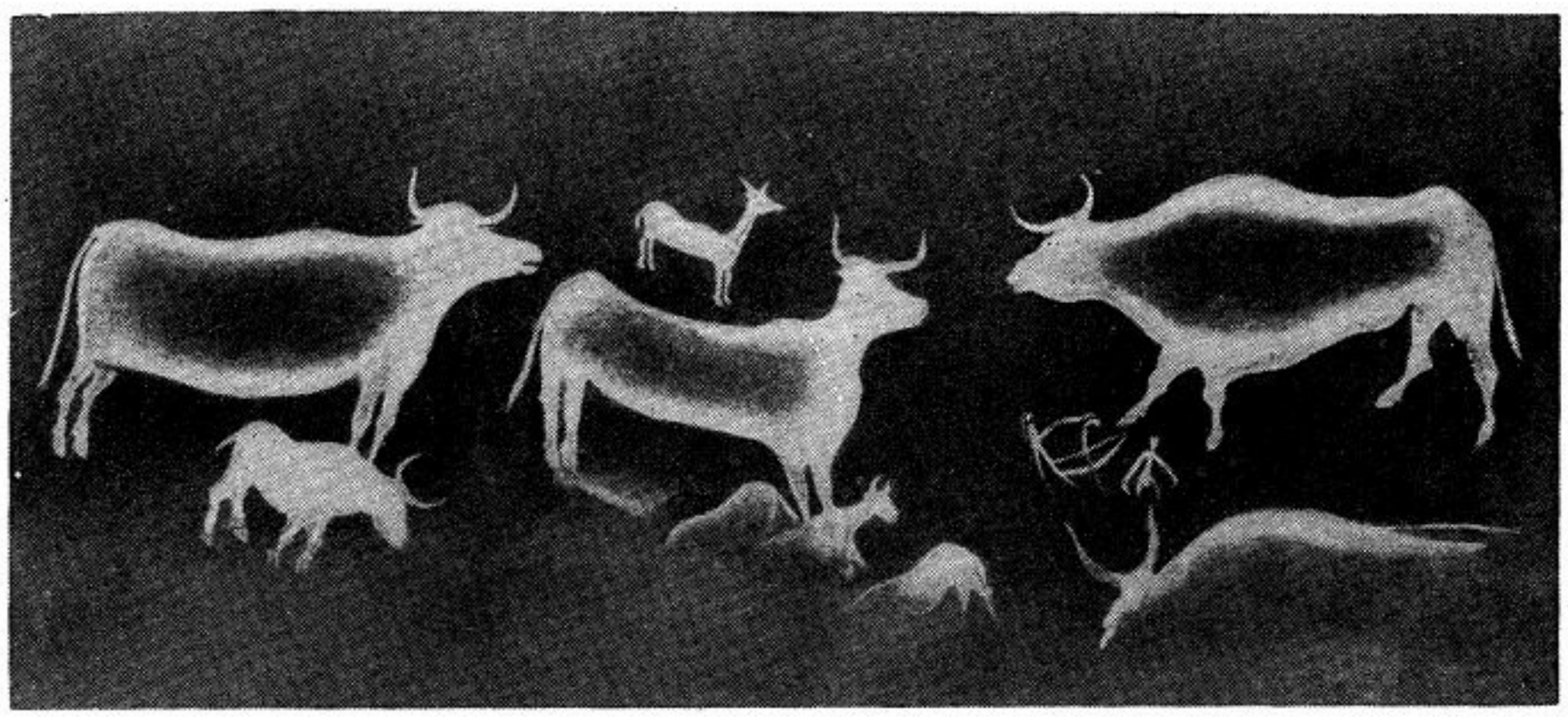
This is a question that thinking people have been asking for many ages, and you are quite right to ask it, but the answer is that the question is not really a correct one. The stars are not kept in position, but are all in movement, and sometimes the stars *do* fall on to one another, we now believe. Astronomers now think that they can find in the heavens two great streams, to one or other of which all the stars belong ; and these two streams of stars are moving through and past each other in opposite directions.

No one has any idea at all how this process started, nor what the results of it will be, but at any rate we are quite certain that there is no such thing as what for so long has been called a fixed star, anywhere. Some people have thought that there may be a centre somewhere, which all the stars move round, but we cannot find any proof that this is really so.

Where Does the Water Go at Low Tide?

The shortest answer to this would be that, at low tide, the water goes to the places where it is high tide. As the Earth spins, under the pull of the Moon and the Sun, the water is always being moved about. Of course, it is always somewhere, and if it is not in one place, it must be in another. When it is pulled to one part of the Earth and heaped up there, that makes high tide.

As we watch the tide rising, what we see is the water being heaped up in our neighbourhood, mainly under the influence of the Moon. But if it is heaped up there, it is being drawn away from somewhere else, and that somewhere else is the place where the tide is ebbing. No tide rises but some other tide falls.



THE CAVE MEN AND THEIR PICTURES

THE story of art begins with a kind of fairy tale so wonderful we can scarcely believe it. Like all fairy tales, its first words are *once upon a time*, and the opening paragraph takes us back at a stride to the Long, long ago.

We cannot at first realise what this Long, long ago means. We think of the period of ancient Greece, but our story lies in the dawn of a much remoter day. We think then of the dynasties of early Egypt, and say there can surely be nothing older ; but the tale is about some people who lived and made beautiful pictures thousands of years before the Pharaohs set up their huge, fantastic statues.

When we have allowed ourselves to be carried back to this Long, long ago, we look for the place of our fairy story, and we find it, not a historic temple, hill, or in the sunlit ruins of great Asiatic cities, but hidden underground, in the half-light of the caves of Europe.

We have been so used to thinking that the oldest of all artists lived in the far-off East, that it is very thrilling to realise they are our own millionth great-grandfathers, and that their art belongs to the Western Continent. Also, until about fifty years ago, nothing was known or guessed of these age-long treasures.

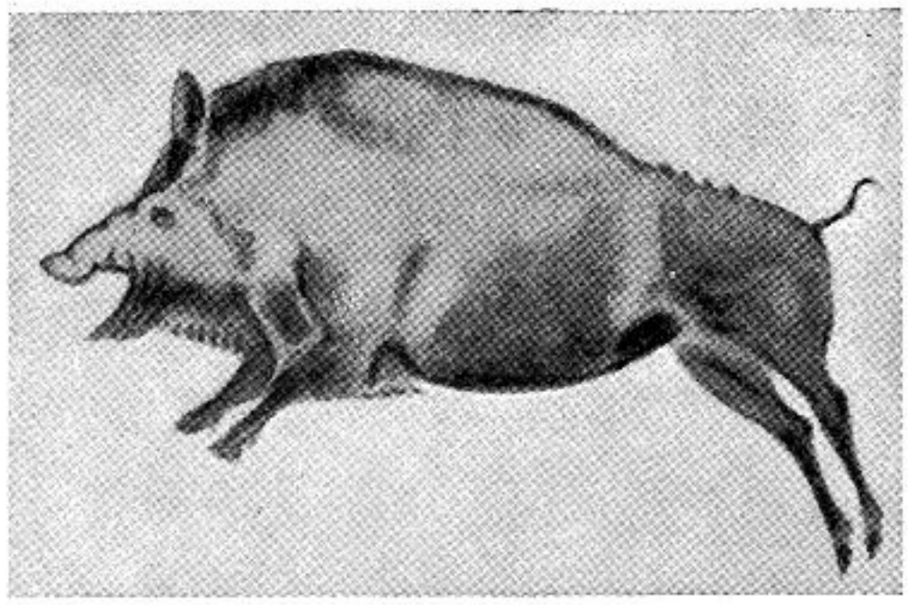
The most wonderful was found quite by accident in the year 1868 by a hunter who fell down through some brushwood into a deep hole that led to a long, underground cavern. So that this incredibly old art is new, and is more truly concerned with hidden treasure than any story that a novelist has ever written.

In order to get to the beginning of the tale we have to go farther back than even the pictures themselves.

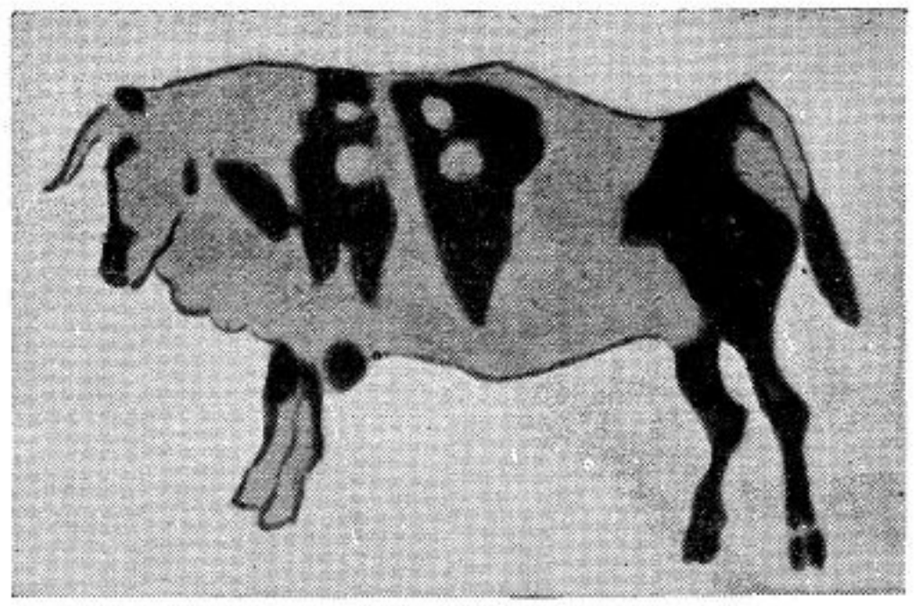
Geologists have divided the history of the Earth's development into four great periods, and during the last of these Europe and North America were held in the grip of an intense Arctic cold. From the heights of Europe grew great glaciers, and compared with them the Swiss glaciers of today are like snow hills down which children slide in winter time.

Before this bitter cold had seized the world, and in between the various epochs of the Glacier Age, the primitive tribes of Europe had been basking in a long summer, living an indolent, semi-tropical life, their food chiefly fruits and berries which were easily gathered. The Mediterranean Sea was so shallow that land bridges were possible, and men and animals trekked across into Europe from Africa and Asia. When Europe slowly cooled to the tem-

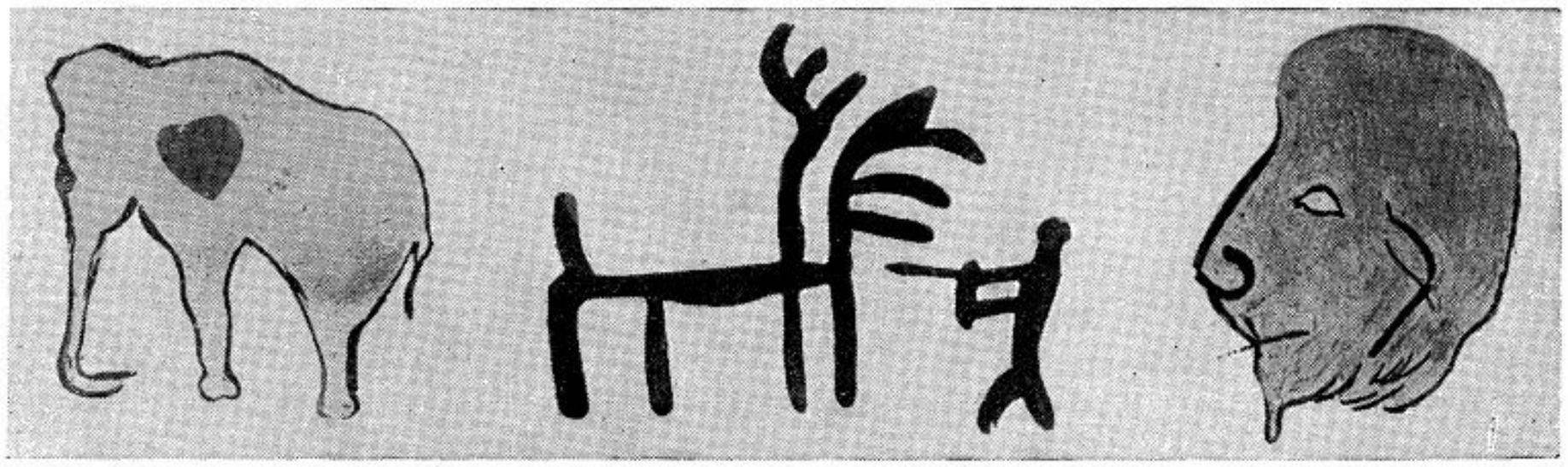
PICTURES FROM THE WORLD'S FIRST GALLERIES



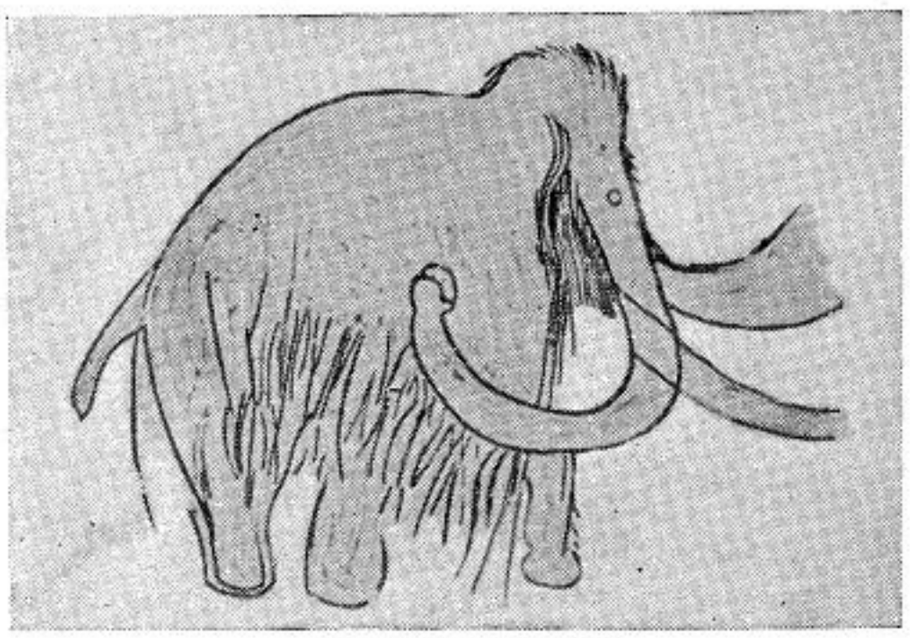
THE WILD BOAR



AN OX



AN ELEPHANT FEEDING — MAN ATTACKING A STAG — A COMICAL FIGURE

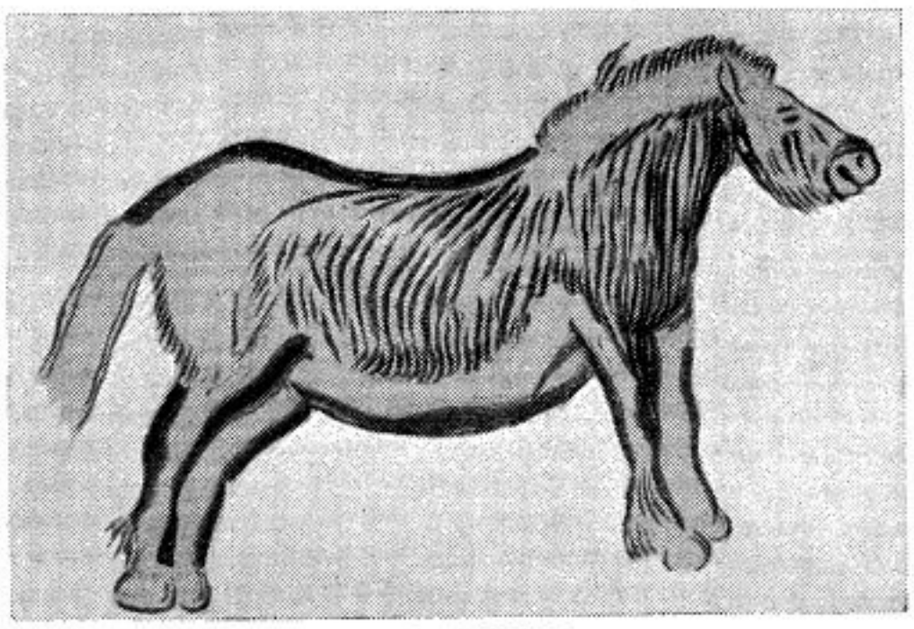


THE MAMMOTH

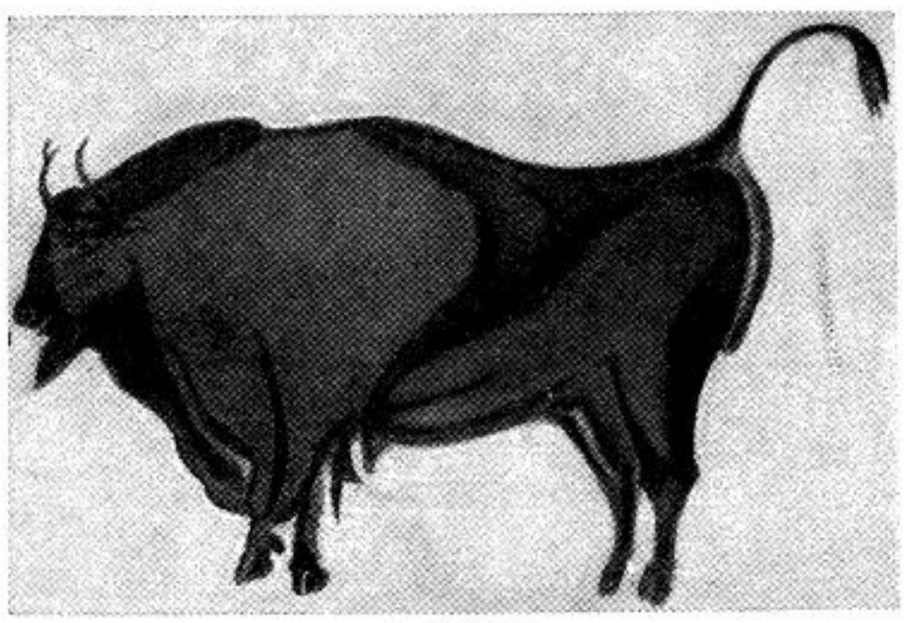
A REINDEER RUNNING.

QUAINT GROUP OF FIGURES OF THE STONE AGE

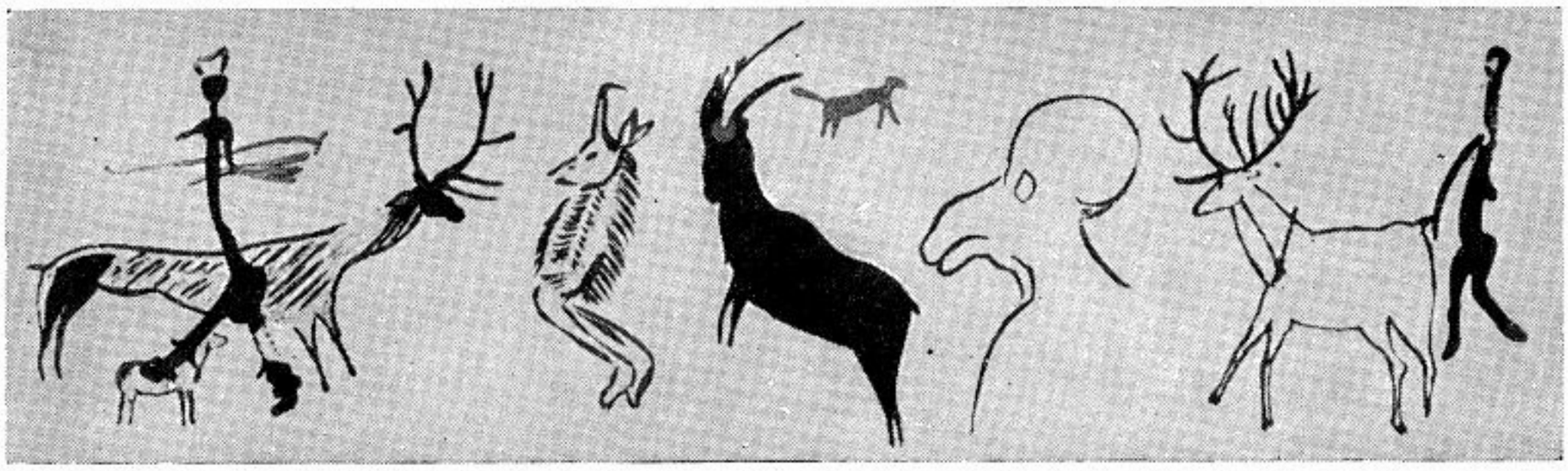
THE JOLLY PICTURES THE CAVE MEN MADE



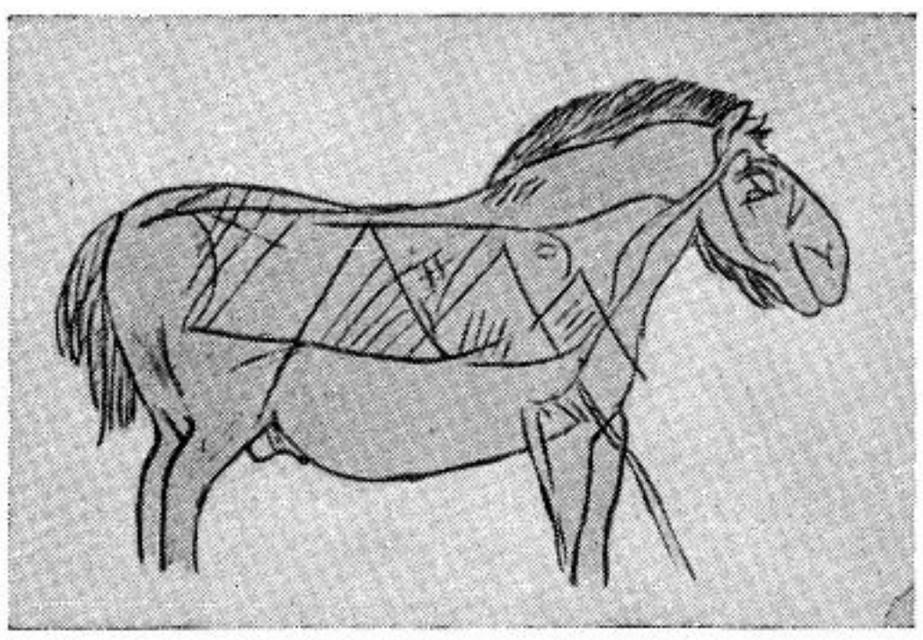
A HORSE



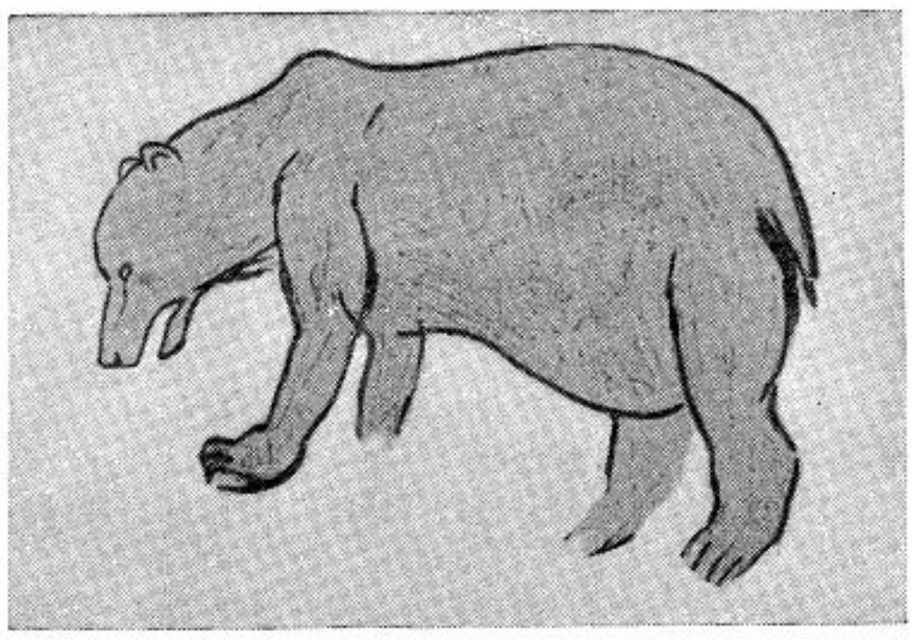
A BISON



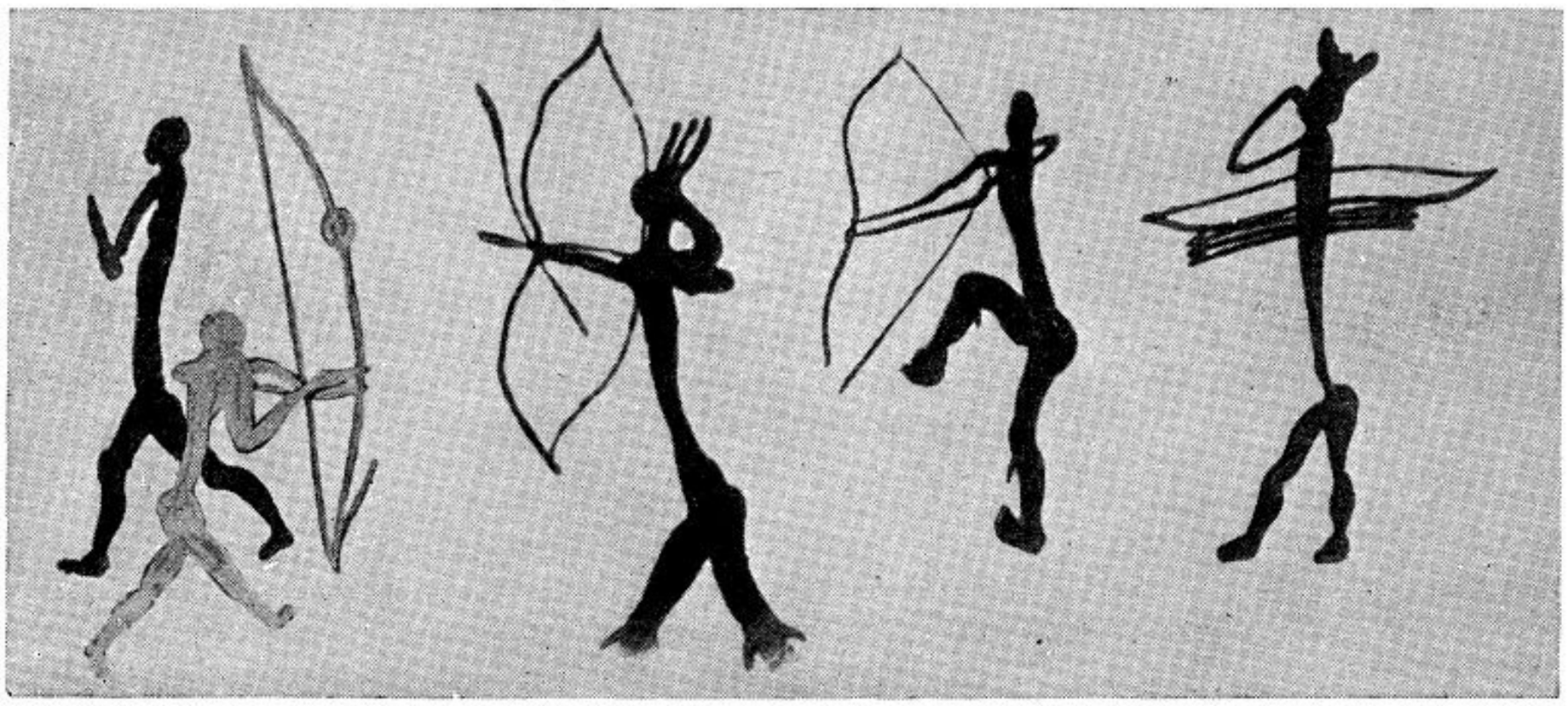
AN ODD PROCESSION OF HUMAN AND ANIMAL FIGURES



A PICTURE ON A PICTURE



A BEAR



THE WAR MEN OF THE STONE AGE

perature of an ice-house, these earliest of all men found that life had become very hard. Their food disappeared, and they must either find new sustenance or die. They turned for the means of life to the flesh of animals, and this hard necessity made of them the greatest race of hunters the world has ever known.

THE AGE OF DARKNESS WHICH WENT BEFORE THE DAWN OF HISTORY

They had only one weapon—a flint knife or dart. A perfect specimen of this implement was found with an elephant's tooth opposite Black Mary's, near Grayes Inn Lane, London, towards the end of the seventeenth century, and this historic treasure was kept and vaguely described as a British weapon. Not till over a hundred years later did scientists learn that the stone dart belonged to an incredibly remote age of the world—to the darkness which preceded the dawn of history.

We can go to the British Museum and see this ourselves, the weapon with which our millionth greatgrandfathers faced and slew mighty beasts. Because of their skill in hunting, the men who lived in Europe during the Glacier Age are often called reindeer hunters, and because the only tools they knew were flint, their period is known as the Stone Age.

The Stone Age, however, merely marks off a stage of human culture, and has nothing to do with measurements of time. The Stone Age lasted for thousands and thousands of years; there are parts of the world where it has not long been dead, or even where it still is; for all the continents did not grow up at the same rate; its most ancient and ancestral home, so to speak, is in Europe.

THE STRANGE LOVE OF BEAUTY THAT CAME TO THE RACE OF HUNTERS

The reindeer hunters were driven to take shelter in caves—very often rocky holes which had been bears' dens—and to keep themselves alive dressed in the skins of the beasts they slew. Arctic animals—the reindeer, musk sheep, mammoth—roved over the frozen fields where formerly the hippopotamus, the African lion and elephant, the hyena and tiger had basked in the sun. As centuries passed by, the reindeer hunters made a kind of rude civilisation of their own. They developed their knowledge of the use of flint instruments, had factories for their manufacture; had cook-houses, and knew something of domestic management in their caves; their dead were buried with peculiar and mysterious rites.

And there grew up in the minds of this race of hard, cruel hunters a strange love of beauty and decoration. It was as if their souls, struggling for expression, turned to Art. We have no knowledge of their speech; they had not developed the first coarse signs which are the beginnings of an alphabet; they knew nothing of spinning or weaving or making pottery.

Of the branches of elementary knowledge which underlie our present civilisation, they were as ignorant as the Arctic fox or the prairie buffalo today. They were very much like animals themselves, rough, ugly, hairy beings with enormous jaws and small skulls. Their whole scheme of life centred round their hunting—the finding of food and skins for clothing, and their thoughts were continually on the animal world around them. We may be quite sure that they had more knowledge of Nature in their queerly-shaped little heads than ever we shall be able to acquire, and they drew animals which show us how marvellously accurate were their observations.

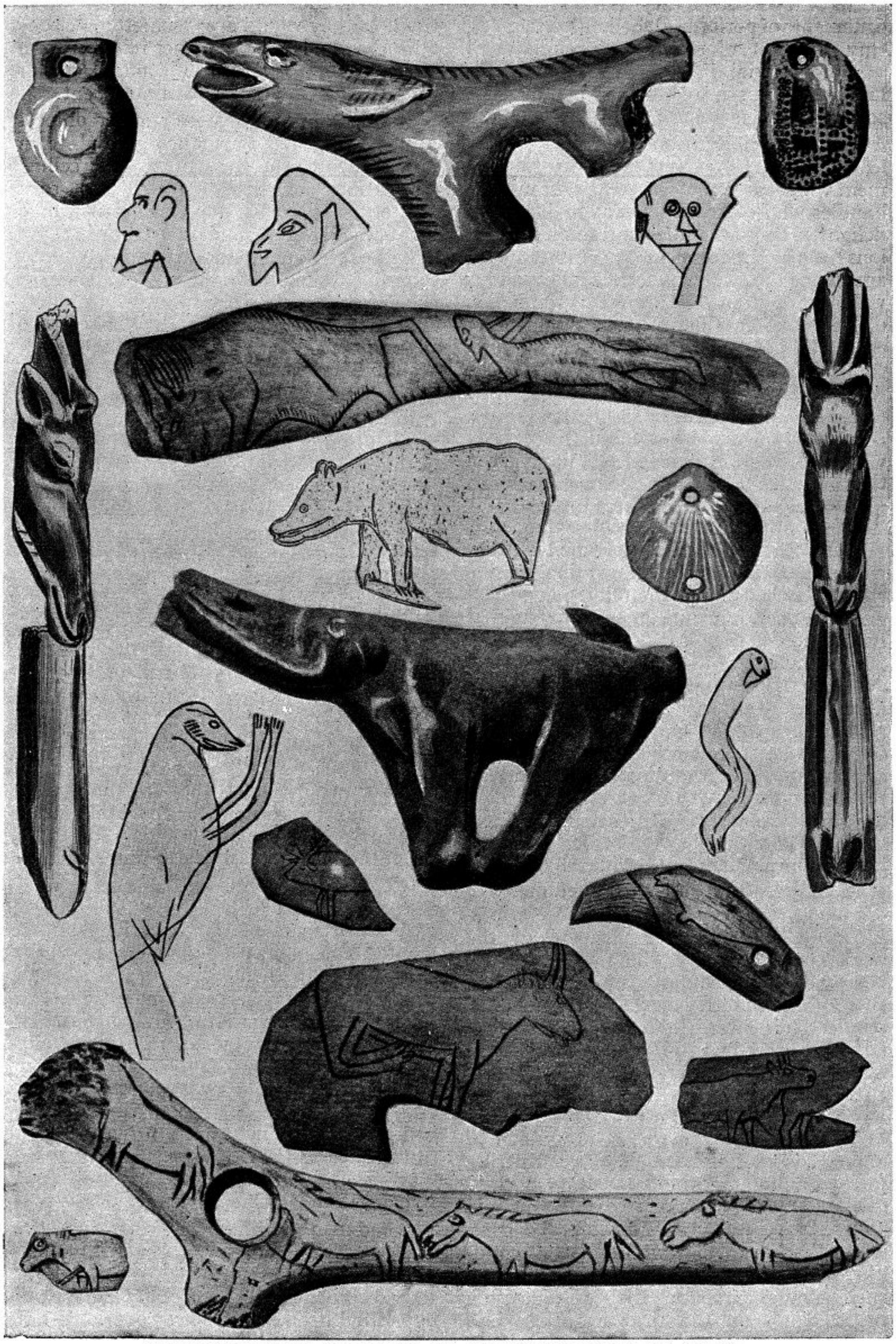
THE MEN WITH FLINT KNIVES WHO WERE REALLY GREATER THAN RAPHAEL

The early drawings, it is true, are crude, and in some cases almost unintelligible. Many are in part undecipherable, for the natural reason that they have lain for thousands of years deep down in the earth. In order to find them, archaeologists have to dig first through depths of the deposits of many ages, and then remove stalactites—which we know take an incredibly long time to form—before they can touch the original cave wall or ceiling where the pictures are.

Not all of the hundreds which have been discovered are worthy of mention, but there are among them some amazingly beautiful drawings. And the men who made them were far greater in their day than Raphael in his, because Raphael was the child of a civilisation that was already old, his tools and medium were ready to hand, the traditions of art established. These reindeer hunters were the heirs of nothing but brute life and naked instincts.

Most of the work of the Cave Men was a kind of rude engraving, done with the point of their one weapon and tool, the flint knife. Before they reached the stage of making frescoes on their walls, they tried their hand on all the small properties of their daily life—the bones, tusks, teeth,

FROM A PICTURE BOOK MADE BEFORE HISTORY



DRAWINGS OF THE CAVE MEN ON BONES AND WALLS OF CAVES

horns of the animals they slew. They made ornaments of perforated shells, horn needles, tiny plaques of schist, ear pendants of various material. For wood they apparently had a slight scorn—probably it did not seem a sufficiently hard substance.

As their civilisation progressed, they learned to make daggers of horn to supplement the stone dart. These were set in bone handles whose decoration was their special delight. Dagger handles and some mysterious horn or bone sticks, beautifully carved, are among the most wonderful of the remains which have been dug up out of the debris of the cave dwellings. The sticks were certainly not a means of defence—more probably do they belong to the class of sticks we call sceptres, or staffs of office ; they may have marked the headship of a family, they may, on the other hand, have been wizard's wands. Archaeologists have given them the name of *bâton de commandement.*

THE OLD-TIME ARTIST SITTING AT THE MOUTH OF HIS CAVE

Upon them the primitive men concentrated their daintiest and most imaginative skill. One can see in the mind's eye these dark-skinned, uncouth men squatting at the mouth of their caves, tossing the hair out of their eyes as they scratched away at their dagger handles or batons. The designs were of various kinds, sometimes repetitive strokes, sometimes a leaf pattern, but more generally adaptations of aniinal life. For the most part, although the creatures drawn were of course too long, in order to conform with the shape of the handle, they are recognisable, and the lines are peculiarly free and life-like.

In addition to these two special pieces of ornament, the Cave Men made pictures—probably for the pure pleasure of the work—on objects for which we have not been able to think of any definite use. Bits of mammoth's tusks and branched reindeer horn were their favourite materials, and it seemed to be the height of their achievement to draw all over the surface.

HOW THEY COVERED THE GALLERIES OF THEIR CAVES WITH PICTURES

Sometimes they made a procession of animals, sometimes a medley of differing forms of life. In the same way, a child given a piece of paper to draw on will cover every inch, upside down and cornerwise. And again, in this delightful, childlike manner, when the artists had used all their available space, they would often begin again on the drawings they had already made. Inside the outline of a reindeer they would draw something else—a fish, or the head of another reindeer, or a horse's head ; or they would find room for something which seems like a serpent.

Interesting as are these smaller objects of the Cave Men's art, they give place in importance to the wall, floor, and ceiling decorations of their cavern and rock shelters. There the love the artists bore for animal shapes and their growing joy in self-expression found an almost endless scope. They covered the galleries of their caves with isolated drawings, long frescoes, and sometimes they attempted to represent the massing of a herd of the creatures of the wild.

The animals they were most fond of portraying were the horse, reindeer, mammoth, bison, and goat. Occasionally they outlined a kind of ox, or deer. Here and there a man is drawn, but it would seem that the cave dwellers were not much interested in themselves, perhaps because they fell short of the brute strength of the four-footed creatures.

THE FAITHFULNESS OF THE PICTURES OF THE FIRST ARTISTS

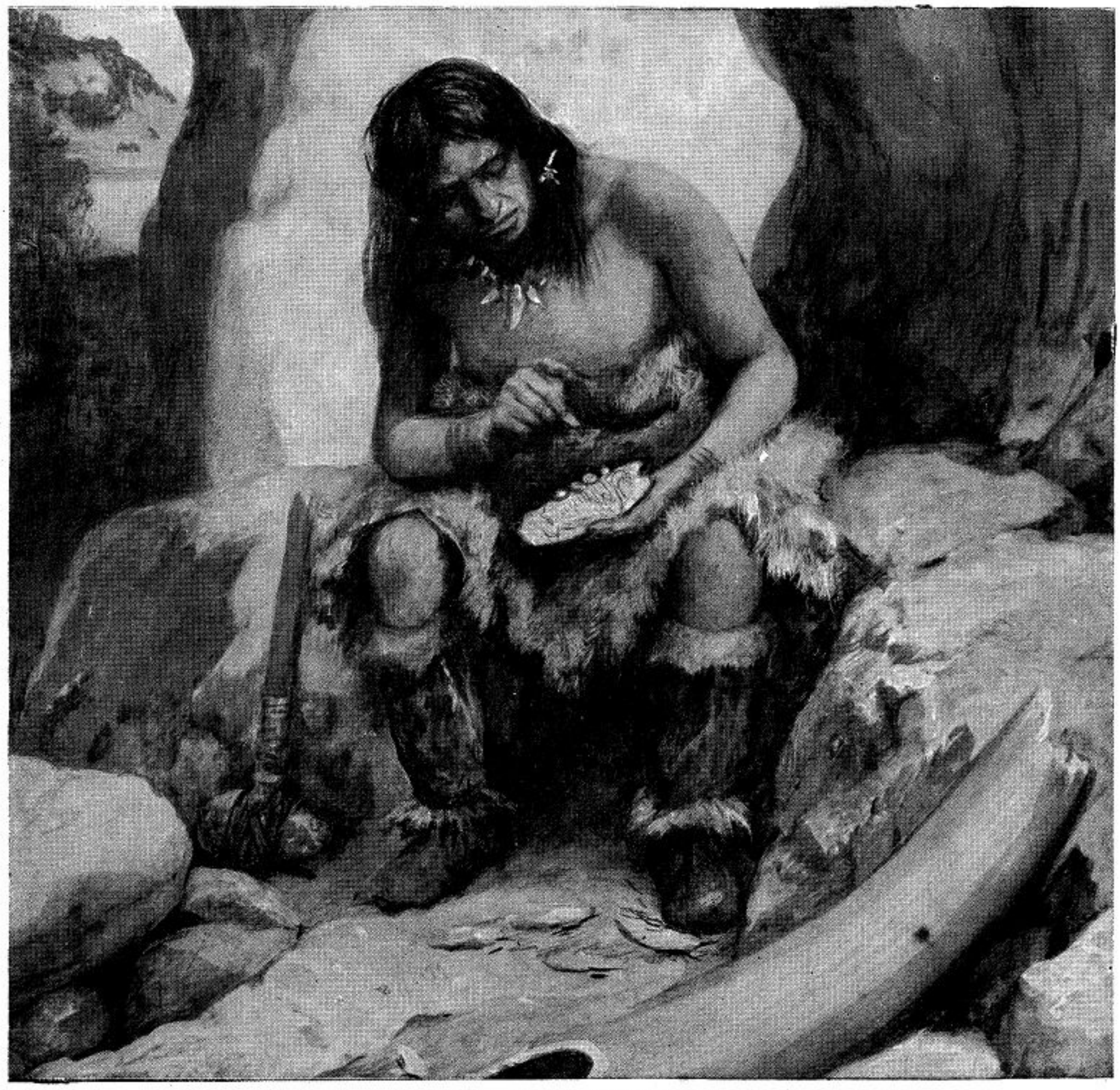
The pictures of animals which still flourish on the Earth we can judge from our own knowledge. From the skeleton of a mammoth found in perfect condition in Siberia, we can judge how faithful were their drawings of this huge creature.

For the most part, these pictures were made on the rock with the point of a flint tool. Sometimes the artists scratched an outline and chiselled the interior rock away to give an illusion of " relief." Their best work was pure engraving of outline.

As their sense of art grew, they supplemented the engraved line with a brush-work line. In their latest stage they had learned to paint. The substance they used, the " pigment," was a mixture of charcoal, oxide of manganese, and some oily material ; and their tubes were hollow bones. Their brushes were of a fine nature, and the result is a freedom of line that artists of today might envy. It is because the art of the Cave Men was in a way so " artless," so free from conscious construction, that it is so great.

We find this simplicity marking the work of famous men all through the ages, for a perfect picture, like a perfect poem, should give the impression of having written or painted itself. If we are conscious that

one rhyme is dragged in to supplement another, one shape to explain another, the poem or the picture falls short of greatness. Such a work may be clever, but, generally speaking, cleverness is the enemy of greatness. Or, to put it another way, *cleverness steps in where pure inspiration fails.*



AN ARTIST BEFORE HISTORY—SCRATCHING A PICTURE ON BONE

One kind of cleverness the reindeer men allowed themselves in their work, and that is very interesting to us because it reveals their unconscious hunger for true shape. They took every possible advantage of the uneven surface of their rocky walls. Where a bump came that in any way suggested an animal's head or a shoulder, they would avail themselves of it as if it were natural statuary, and make a line round it. In some cases this blending of relief and contour made a startlingly good, vivid piece of work; in others it would seem that the artists left the engraving unfinished.

In the south-west of France, in the district of the Pyrenees, and in northern Spain, about forty of these underground picture galleries have been discovered. The conditions of life in this part of Europe seemed to be the happiest and most productive of art.

There have not yet been discovered in England any great wall engravings like those of the Continent, but the search has only just begun, so that it is quite possible that, hidden about eighty feet below the earth's surface, there are rocky walls with beautiful frescoes drawn by the Cave Men.

In this most fascinating branch of archaeology it is impossible to say definitely to what district belong the greatest treasures. Scientists are continually ex-

ploring, and classifications are made to-day to be undone tomorrow. At present, the finest and most famous wall pictures are at Niaux near Tarascon in France, and Altamira in North Spain. There are few things more wonderful in the history of art than the horde of animals that chase each other across the rocky roof of the Altamira cave. We wonder were they done by one man or many, by a family or by a generation, and still more do we wonder what kind of art the Cave Men would have evolved had their strange civilisation developed. All we know is that, about 12,000 years before Christ was born, there came another of those mysterious slow Earth changes. The ice fields melted and Europe became a bed of rushing rivers and swollen lakes; the face of the Continent was altered. The bed of the Mediterranean was filled, the English Channel and North Sea divided Britain for ever from Europe. The mammoth and the reindeer retreated to the Arctic Circle, one to disappear from the world before the world had really begun.

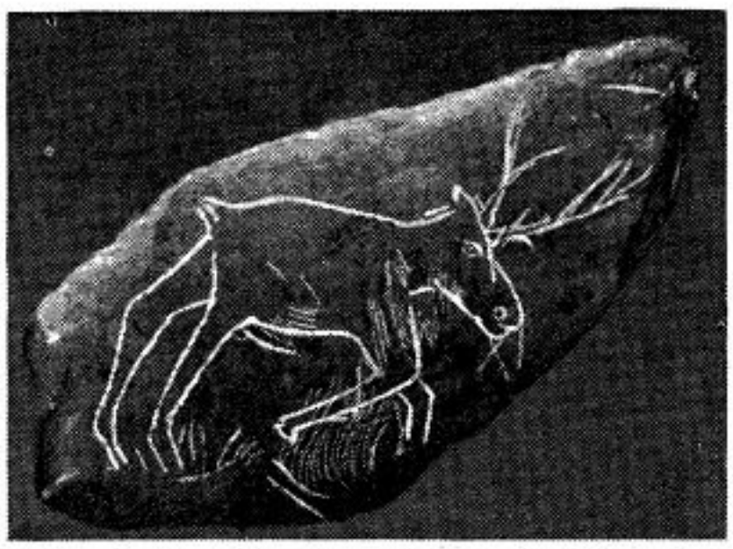
The Cave Men died out, gave place to a new order who discovered metals and grain, and learned to spin and make pottery. The first of the layers of earth and debris began to grow on the cave floors. The Bronze Age, another of those stages of human culture, superseded the Stone Age. The dawn of history, for Europe at any rate, then began.

The Stone Age, of course, was not confined to Europe, but it existed in different parts of the world at different times. Among certain semi-civilised races the retreating Stone Age is still within hail, so to speak. Even so late as the close of the eighteenth century, one third of the habitable globe had not advanced beyond the use of flint tools.

From Egypt, Palestine, and the still uncultivated peoples come traces of the Stone Age, its rude, harsh way of living, and its arts. But the use of flint has been overlapped in time in many countries by the use of other tools and the knowledge of other medium and material, so that we do not get anywhere else such an isolated splendour as the cave drawings of Europe, such an epoch so set apart from the conflict of different kinds of development. The expressions of art among the backward peoples of the earth are, generally speaking, flavoured by superstition.

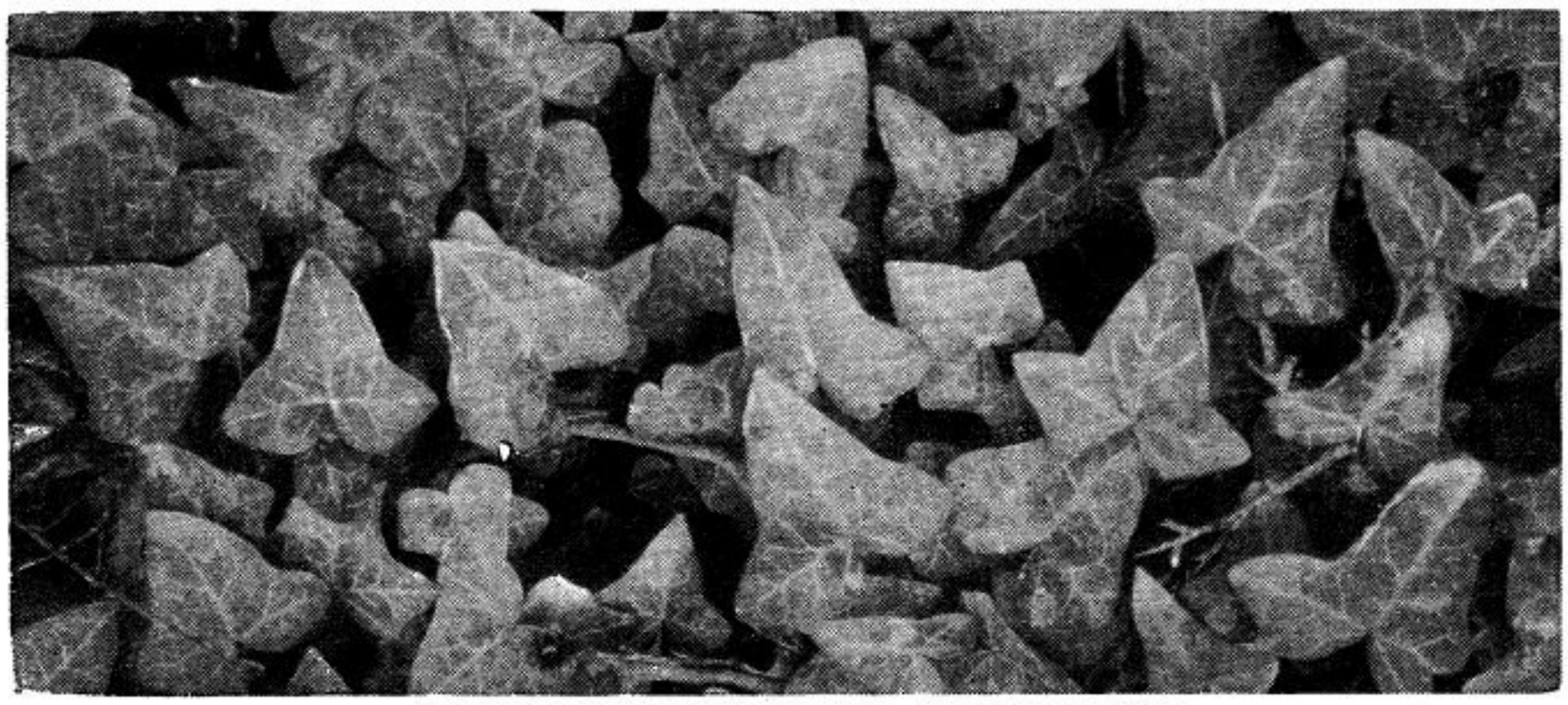
Only here and there do we find a faint family likeness to the pure art of prehistoric man in France and Spain. The early Red Indians chiselled drawings on the face of the rocks of the Pacific coast. The Esquimaux still engrave beautiful and very small designs on walrus tusks and teeth, and so on. But the Red Indian art degenerated into the carving of the mysterious and hideous totem poles of the various tribes. Strangely enough, the real primitive art of the Red Indian is a craft—basketry. The most perfect and delicate basketry in the world—woven from strands of the pith of certain trees—comes from a quite uncivilised tribe in California. In Polynesia we find skilful engraving done on turtle shell—queer, clever, and grotesque carvings in wood. The Maori races in New Zealand have left some amazing engravings on whalebone and wood, and their wonderful canoes show to what an extent they have developed the art of carving.

But all these peoples lack the simplicity of thought that underlay the work of the reindeer hunters. They revel in coarse representatives of the human body and superstitious idolatory. When we think of their work and then turn back to the art of the European Cave Men, we get a sudden sense of purity and vigour, of a strong, clear wind after a foul atmosphere. The art of the reindeer hunters is separate and distinct, and can never be forgotten.



An elk scratched on a flint in Norfolk perhaps 6000 years ago

Some fifteen thousand years have rolled over the world since those early cave pictures were made. Thousands of generations of men have walked across the hidden roofs where animals chase each other in an eternal line of beauty. As we think of those artists long ago it is impossible not to be moved by a sense of awe. It is like looking back on a world of dreams; and, indeed, it seems that those dim, remote figures are the stuff that dreams are made of, their little lives rounded by a sleep.



The Ivy spreads out its leaves to catch the sunshine

THE FIRST LIVING THINGS

When life first appeared on the Earth, there was nothing for it to feed on but lifeless things, like air and salt and water ; and the only kind of living creature that can live on such things is the plant.

So we may be quite sure that the first living things were plants, not animals. Now what the first plants did at first all plants do still. The trees, different in so many ways, living for hundreds of years, and sometimes so large that you could drive four horses abreast through the trunk of one of them, yet feed in just the same way as the first plants that were formed at the bottom of the sea ages ago.

Now let us study the history of plant life and see how plants have grown ever more numerous and more wonderful.

If we dig down very deeply into the Earth we find ourselves passing through the first layer to another layer of a different kind, and then to another and another, and so on. We know that these different layers, lying below the one that we live on, were once at the surface and have been covered up ; and so as we dig down, and find remains of different kinds of animals and plants, we can tell something as to what the story of life has been on the Earth.

You can guess, perhaps, what kind of plants the first ones were. There were no trees or flowers, but there were plants rather like seaweed, and also simple plants of a very humble kind that were close relatives of simple plants of today, such as the mushroom and the toadstool. Those men who know most about this matter are also sure that near the very beginning of life there were to be found the kinds of plants which we now call microbes, some of which are apt to enter our bodies now and make us ill.

Then, higher up, later in history, and nearer our own days, we find evidence that plant life was becoming richer. This stage is the stage of the ferns, and in those days everything seems to have been just exactly right for the life of ferns, which flourished richly for a long, long time. They became very large, too—giant ferns, such as we cannot see nowadays. The remains of these are now changed into coal, and very useful we find them today all over the world.

But all this time there is no sign at all of what are called the higher plants ; there were no flowers, or, to use a general sort of word, there were no *flowering plants*. But in time flowering plants did appear, and they soon made room for themselves.

Many of the kinds of plants that had a good time of it before died out, either

altogether or very nearly. The flowering plants were cleverer than any of the older kinds ; they were fitter to live in the world that they found around them, and so they succeeded. Just as animals with backbones are the masters of the animal kingdom, so the plants that bear flowers are the masters of the vegetable kingdom, though they have not entirely destroyed all the older kinds.

We can still, indeed, find living plants of lower kinds, which are really not very different from many of the plants found deep down in the Earth, which lived at a time when there were no flowering plants at all. But nevertheless the story of the plants is a story that leads steadily up from very small beginnings to the flowering plants, including all the mighty trees.

THE OXYGEN THAT EVERY LIVING THING IN THE WORLD MUST HAVE

And now let us see what we mean when we say that a plant breathes. If we can understand the breathing of a plant, we shall understand the breathing of every living thing, including you and me. When we talk about breathing, we usually think of the way in which our chests move up and down, as we draw the air into our lungs, and then let it out again.

But a plant has no chest or lungs, and many animals have neither chest nor lungs, yet they must all breathe. There are many different ways of breathing, but they are all really the same at bottom, whether it is the breathing of a plant or a fish or a man.

Wherever living things are to be found, whether under the water or out of the water, there must always be a particular kind of stuff called oxygen. This is a thing we may have never seen or heard of, and yet, whenever we see anything at all, we see through oxygen—because it is part, and the most important part, of what we call air. Oxygen is found in air, and it is also found in water. If a living thing lives in air, it takes oxygen from the air. If it lives in water, it takes oxygen from the water.

HOW THE FIRST PLANTS FOUND THEIR FOOD IN WATER

The first plants took oxygen from water because they lived in water, like many plants of today, and like crabs and fishes and many other animals. But later plants, like the flowering plants, moved out of the water on to the land, just as animals have done, and so they take their oxgyen from the air, just as cats and horses and birds and men do.

Breathing is an act that has two parts, and the first of these two parts is this taking in of oxygen. Every living thing does this, and must die if it ceases to do it. But what is the second half of this act of breathing ? Directly we think about it we shall see that the oxygen which is taken in by breathing must go somewhere, something must happen to it, and the second half of the process of breathing consists simply in giving back oxygen to the air or to the water.

But if that were all, of course there would be no sense in it ; it would not be worth doing. But the point is, that while the oxygen comes in alone, " by itself," it always comes out again joined to something else ; and it is that which makes all the difference. This something else, though you could hardly believe it, is the same stuff as that which makes coal and diamonds and the writing part of lead pencils, and its name is carbon.

NO LIVING THING CAN GO ON LIVING WITHOUT BREATHING

When the carbon which the oxygen meets in the body of the animal or the plant is joined to the oxygen, it is turned into a new kind of stuff, like the stuff which comes through pipes into houses, and is burnt at the end of them—a kind of gas, the special name for which is carbon dioxide. Every living thing, from its first moment of life to its death, breathes in oxygen and breathes out this stuff which is made of carbon and oxygen, and is called carbon dioxide.

Now, plants must do this because they are living things, and no living thing can continue to live without breathing it. But this breathing is not one of the things that a plant is very good at. Indeed, a plant breathes just enough to keep itself alive. It is quite easy to prove that a plant must breathe to some extent, at any rate, because you can suffocate a plant as easily and certainly as you can suffocate an animal. If you keep away all oxygen from an animal you suffocate it, and it will die, and the same is true of a plant.

Indeed, we may be sure that every living thing will die of suffocation if it does not have enough oxygen all the time, day and night. But a plant needs far less oxygen than an animal, because it breathes much more slowly, and the curious thing,

as we must now see, is that most plants are specially good at doing something which is just the opposite of breathing, something which no animal can do, and which every animal depends upon plants to do for it. The plants that do this wonderful thing that we are going to talk about are all green plants, or, at any rate, if they are not green, like grass, they are brown, like seaweed. But the little difference in colour does not matter, for the stuff that makes the seaweed brown is really the same as the stuff that makes grass green. This stuff is so important that we must think of all plants in the world as divided into two great kinds—those which have this green or brown stuff,

ONE OF THE FIRST OF ALL LIVING THINGS—THE SEAWEED, IN THE SHALLOW WATERS WHERE LIFE IS SUPPOSED TO HAVE BEGUN

and those which have not. The first kind we shall call green plants.

Very nearly all plants are green plants, but we have already mentioned one or two that are not—such, for instance, as the mushroom.

The green stuff of all other plants is really one and the same everywhere—even when it is brown, as in some seaweeds. It has the long name of chlorophyll, but we may just call it green stuff.

This green stuff is most important because of what it enables the plant to do, and that is what we must now talk about. But we must begin at the beginning—and that beginning is not the green stuff itself, but the Sun, the great and glorious Sun. By itself the green stuff can do nothing; it is of no use to the plant, and is only a burden to it. Indeed, if plants are cut off from sunlight altogether, they die at once, or, at any rate, lose all the green stuff in them. It is the Sun that makes the green stuff in the plant, and the green stuff's only use is to help the plant to profit by the Sun.

Now this is just a tremendous fact, and we should make a very great mistake if we went on to talk about what the green stuff does without making quite sure that we understand what the Sun does. Without the Sun there would be no life at all upon the Earth: *No Light, no Life.*

The green stuff, then, though necessary for life, is only an instrument, something the light uses to make life. If the Sun were to go out all the green stuff in the world would not help us at all, and all the plants and animals would soon die.

Yet though we have learnt how important the Sun is, we can still look at the green stuff of the green plant with an interest, since it is the means by which light can produce life.

This green stuff is to be found in other parts of plants besides the leaves. We know that the stalk of a rose is green. But most of the green stuff of plants is found in their leaves, and it is for the sake of the green stuff that leaves exist at all. The leaves of a plant are its tools for using the green stuff. Directly we think of a leaf we see that it is made in a particular way.

It is a flat, thin thing. So much are leaves flat, thin things that we call other things which are flat and thin "leaves," though they are not parts of a plant at all—the leaves of this book, for instance. The first books were made of real leaves.

Now, there is a very good reason why leaves should be flat and thin. Leaves exist in order to expose as much green stuff as possible to the light. If a leaf were shaped like a ball, only the green stuff on the outside of it, and, indeed, only the green stuff on the side of it which was turned to the Sun, could receive the sunlight. All the rest would be in darkness, and that is as good as to say that it would be quite useless.

WHAT THE SUNLIGHT DOES WITH THE GREEN STUFF

Perhaps you never asked yourself before why a leaf is shaped like a leaf; but the question is worth asking, and the answer is that no other shape can be even thought of that would be so useful.

We have said that there is something the green stuff does by means of the sunlight, or, better still, there is something which the sunlight does by means of the green stuff. What is it?

If we go back to what we said about the plant's breathing, we shall remember that the plant is surrounded by air. We have seen that this air contains oxygen, which is a gas, but it also contains many other gases, for the air we breathe is nothing else than a mixture of gases. Now plants, as well as animals, breathe air, but all green plants do also what no animal can do—they eat air. The gas in the air which plants eat, or feed upon, is, curiously enough, the same gas as that which the plant gives out while breathing—carbon dioxide.

THE GREATEST DIFFERENCE OF ALL BETWEEN A PLANT AND AN ANIMAL

The only way in which the plant can get food out of the carbon dioxide is to split it up into the two things of which it is made—carbon and oxygen, to keep the carbon, which is good food, and to give back the oxygen to the air. In the long run it takes from the air far more carbon than it gives to the air, and builds up this carbon into its own body.

The greatest difference between animals and plants lies in this great power that the plant has of taking carbon dioxide from the air, splitting it up into its carbon and oxygen, giving back the oxygen to the air, and building up the carbon into its own body. As it is building the carbon up into its own body, it fixes the carbon on to other kinds of stuff in such a way as to make things which animals, including ourselves, can eat.

All animals, like all plants, require carbon, but if we were left with nothing but the carbon dioxide in air to get our carbon from, in a coal-mine, with tons of carbon all round us and tons of lead pencils and millions of pounds worth of diamonds, we should die of starvation in a day or two.

The carbon becomes of use to us only after it has been built up into food substances by the green plant, and if carbon food were not made for animals in this way the whole animal world would die of starvation.

Let us try to see what it is that happens. Carbon dioxide, as we have seen, is made up of carbon and oxygen, and these two things are joined together so strongly that it needs very great power, used in just the right way and at just the right moment, to separate them. But what men find so difficult is quite easy to the green leaf in the sunlight.

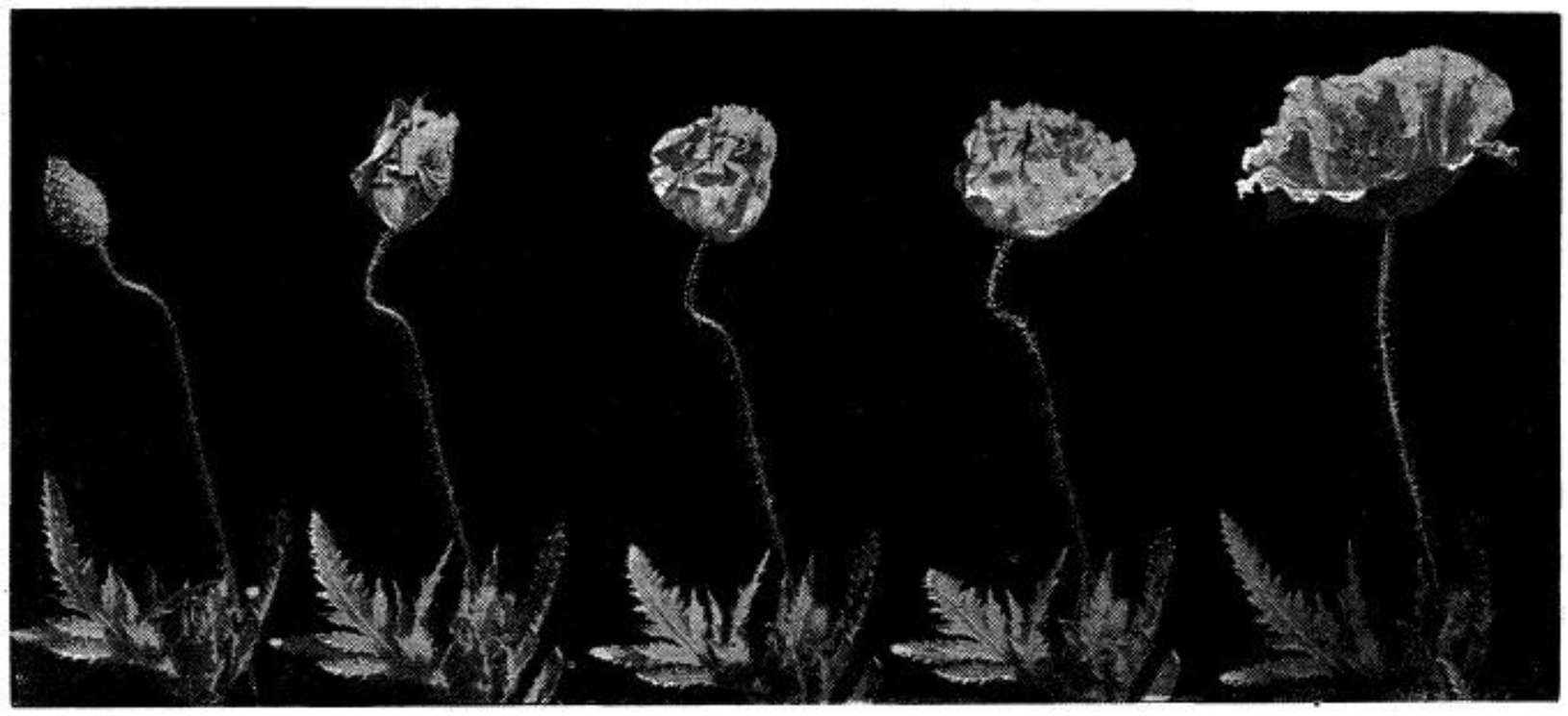
HOW THE GREEN LEAF BEATS THE CLEVEREST MAN IN THE WORLD

The green stuff in the green leaf has no power of itself, and you understand that it is power which is wanted in order to separate things which are tightly joined together. The more tightly a nail is in a wall the harder you must pull to get it out.

Now, there is no power in the world stronger than the power of sunlight. The sunlight which pours down upon the green leaf is power. Clever men can help themselves to far more power than the green leaf can get, but they cannot apply it, and so they can scarcely do what the green leaf does. The green leaf beats the clever men because of the green stuff it contains. It is its green stuff that makes it able to apply all the sunlight it gets to the business in hand, which is to split up the carbon dioxide gas of the air into its carbon and oxygen, and to keep the carbon for the use of the plant. This is done without any noise, without any fuss, without any machinery, without great heat, without any waste at all, and without any wear and tear of anything.

And now we know the miracle that is going on in every green leaf in the world.

The Story of the Marvellous Plants that Cover the Earth



A PLANT'S STRUGGLE FOR LIFE

UP to a certain point the outer world is what we may call a friendly home for living creatures. They are not strangers in a strange land.

Thus the circulation of water by mist and cloud, wind and rain, helps them greatly. The atmosphere is a useful curtain, and it contains the Big Four elements—carbon in the form of carbon dioxide, hydrogen in the form of water-vapour, free oxygen which has been formed for the most part by green leaves, and abundance of free nitrogen which a few plants are able to capture. There are many other ways in which the Earth is hospitable to living creatures, and the question rises, Why must plants and animals struggle as they do?

The outer world is in a measure friendly to plants, but it is very changeful. Not only are there regular changes to be faced —night after day, winter after summer— but there are irregular vicissitudes, such as tempests, floods, hailstorms, drought, and severe frost. The plant must answer-back to these changes or perish.

Just as we, in a small way, must change our clothing according to the season and weather, so in a deeper and subtler way the plant must. This is the *Struggle with Fate*, and Darwin, whom everyone knows as the great student of struggle, pointed out that the plant's struggle with drought at the edge of the desert was as real as the plants struggle for room and light in the crowded jungle. Where water is abundant at a rainy season, and scarce for a long time, we find water-storing tissue, as in cactuses, a thickening of the plant's skin, a reduction of foliage, and a greening of the stem. When the cold is apt to be excessive, we find many precautions, which have become in the course of time established, all without taking thought for the morrow, such as the curious woolly covering of edelweiss.

The second reason for struggle is to be found in the rate at which many plants multiply. The river of life is always over-flowing its banks. A single plant of hedge-mustard may produce 730,000 seeds, and it has been calculated that if each seed germinated and developed into a plant which seeded, the members of the next generation would be touching one another all over the earth. Of course, this does not happen—*because of the struggle for life.* The director of Brooklyn Botanic Garden tells us that a fern of moderate size produces every year about fifty million spores. If each of these spores (he says) ultimately produced a mature fern-plant, and if we allowed only one square foot of elbow-room for each plant, the progeny of one

parent only, in one season, would require 50 million square feet, nearly two square miles.

If each of these plants produced fifty million offspring the next season, the descendants of only one fern plant would, in two years, cover the stupendous area of over 89 million square miles, half as much again as the land surface of the Earth.

We see, then, that plants have to struggle not only because the outside conditions are very changeful, but also because of the rate at which plants tend to multiply.

THE LIVING CREATURE ROLLS UPHILL AS WELL AS DOWN

But is there not a third reason for the struggle—a reason wrapped up with the central secret of life? Every vigorous living creature is *always asking for more.* It is of the nature of the living creature to assert itself, and to answer back to difficulties and limitations.

Just as the loosened stone rolls down the hillside, crashing through obstacles until it reaches the level ground or is jammed, so the living creature soon gets some way on and will not be hindered. But the living creature rolls uphill as well as downhill—that is its secret. Plants and animals alike may be compared to clocks that can wind themselves up. We must not dwell on this reason for struggle, for it is very difficult; but the fact is that the more a plant succeeds, the more it asks for. It is a hustler and a jostler, though it looks so quiet. To put it another way, the plant does not readily submit to being hindered by difficulties and limitations.

John Burroughs tells of a young plant which burst its way through the asphalted hard surface of the pathway on the side of a street. It had been buried alive, but it would not submit. Without any tools or explosives it broke its way out—by the gentle force of growing. So we see that plants must struggle—because the outer world is changeful and callous, because they tend to have such big families, and because it is their very nature to assert themselves against difficulties.

CARING FOR SELF AND FOR OTHERS IS THE BUSINESS OF LIFE

For plants, as for animals, the business of life is twofold—caring for self and caring for others; and the most important part of caring for self is the quest for food.

We have already seen that all ordinary green plants feed on the carbon dioxide mixed with the atmosphere, and absorbed by the leaves, on water, usually from soil, and on salts like saltpetre, which are taken in by the rootlets along with the soil-water. As there is in all ordinary cases an abundance of this simple kind of food the struggle must be *in tapping the supply and competing with other plants* which are doing the same. We shall come to this competition later; it is useful first of all to notice some of the more or less unusual ways in which plants feed.

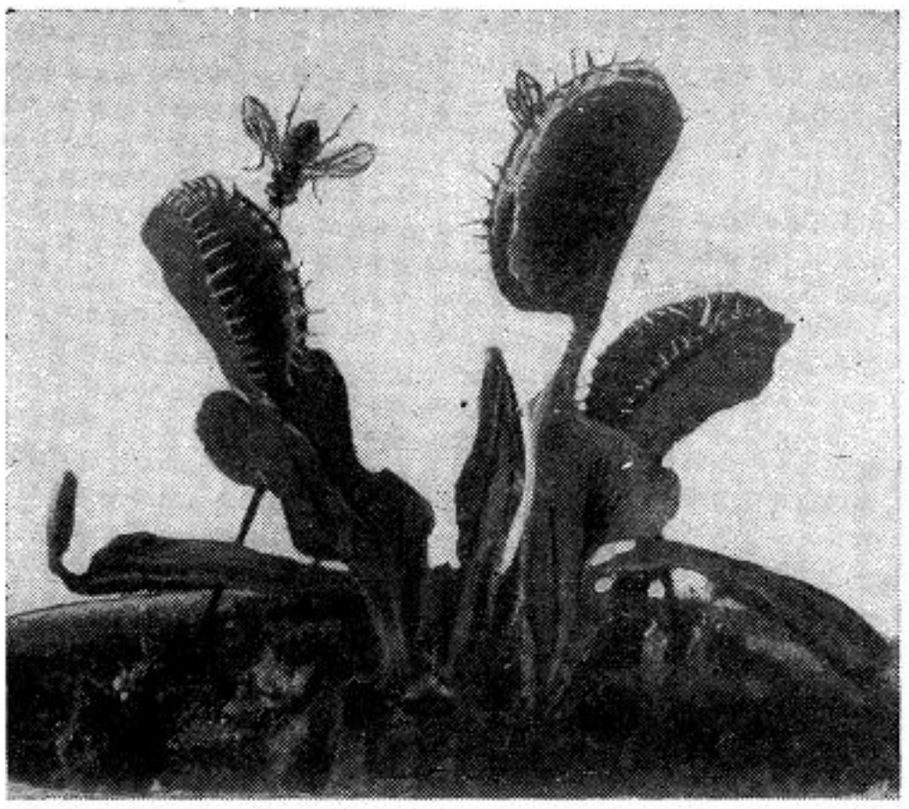
In boggy and marshy places the soil is poor in nitrogenous salts like saltpetre, and this makes plant life difficult. For living matter is in part a complicated mixture of nitrogenous carbon compounds called proteins—like the gluten for the sake of which we eat bread—and if the living matter is to be kept going and growing there must obviously be *nitrogenous* food. Therefore, boggy and marshy places cannot be peopled except by plants which have some special fitness for thriving in the poor and peculiar soil. Immediately we see why bogs and marshy places should show so many insect-eating plants, like sundew, butterwort, Venus fly-trap, bladderwort, and some pitcher plants, which are able to eke out the scanty nitrogenous food supplies by capturing insects and other small animals.

THE PLANT THAT FLOATS IN THE POOL WITH HUNDREDS OF LITTLE TRAPS

The bladderwort floats in the pool in the marsh; it has not even roots; it absorbs everything through its green leaves and shoots. But it has hundreds of little traps, each about the size of the head of a blanket-pin, and these serve to capture water-fleas and other small fry. The small animal pushes its head against a swinging door and enters the trap. The door closes automatically behind it, and the prisoner dies, rots, and is absorbed.

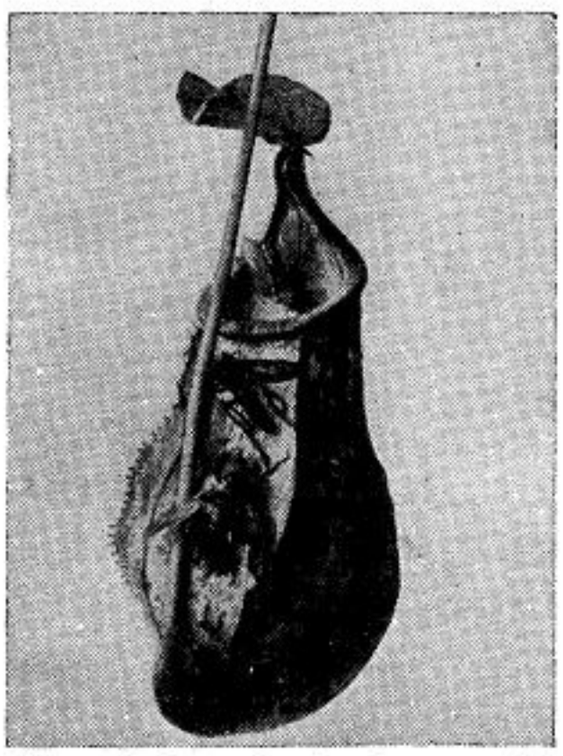
The beautiful sundew spreads its leaves on the bog moss—each somewhat like a flattish spoon with a narrow handle. The expanded part of the spoon is surrounded by tentacles which are tipped with dew-like drops of sticky secretion, and these tentacles are exquisitely sensitive to the touch of a small insect. They bend inwards like the fingers of a closing hand, the insect is securely captured, digestive juice is poured out upon the prisoner and what is useful in its body is dissolved and absorbed. The tentacles then expand again. So the sundew flourishes.

HOW PLANTS MAKE THEIR WAY IN THE WORLD

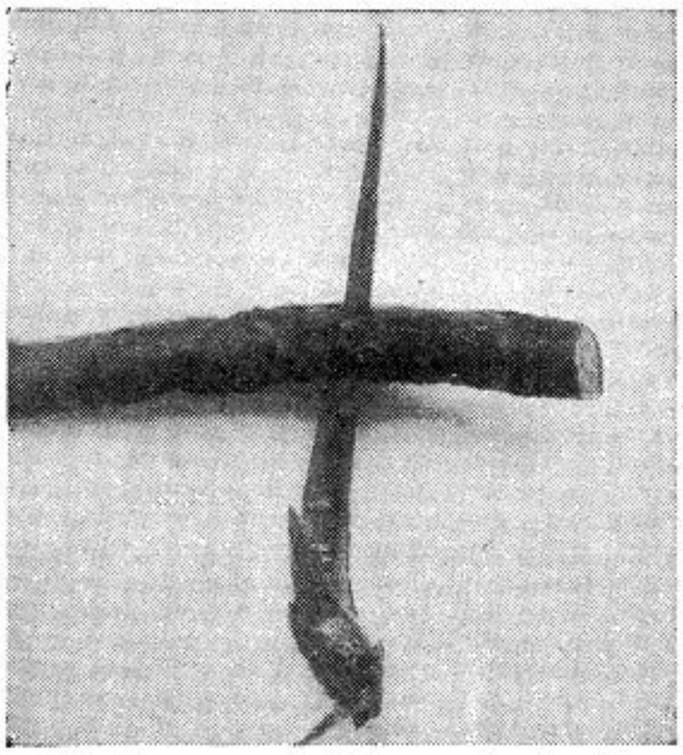


The Venus fly-trap whose leaves close like a spring trap over insects that alight on it. The plant then proceeds to digest the body of the insect.

The prickly spikes with which Nature has endowed the gorse as a defence against browsing animals. The gorse therefore grows freely on open heaths.

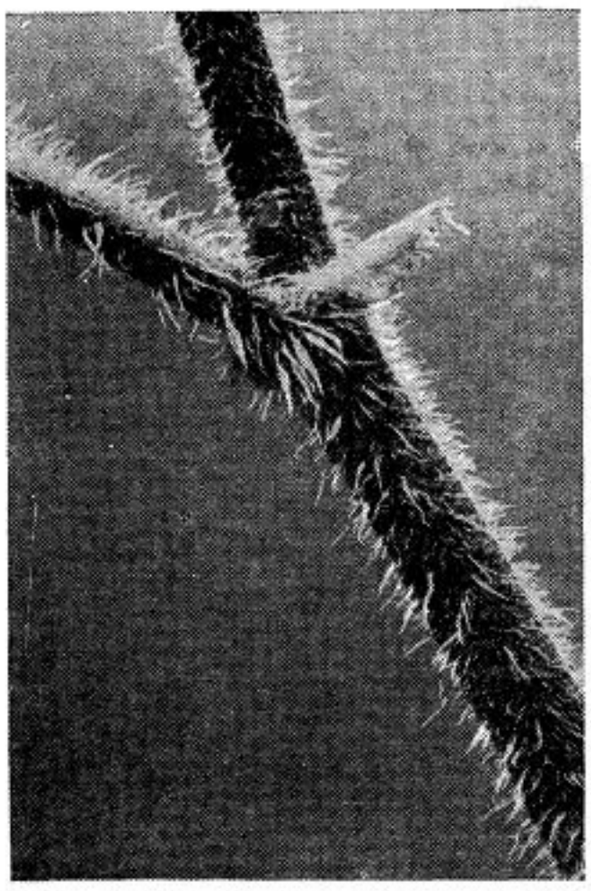


The pitcher plant whose acids digest the insects attracted into it by the honey glands.

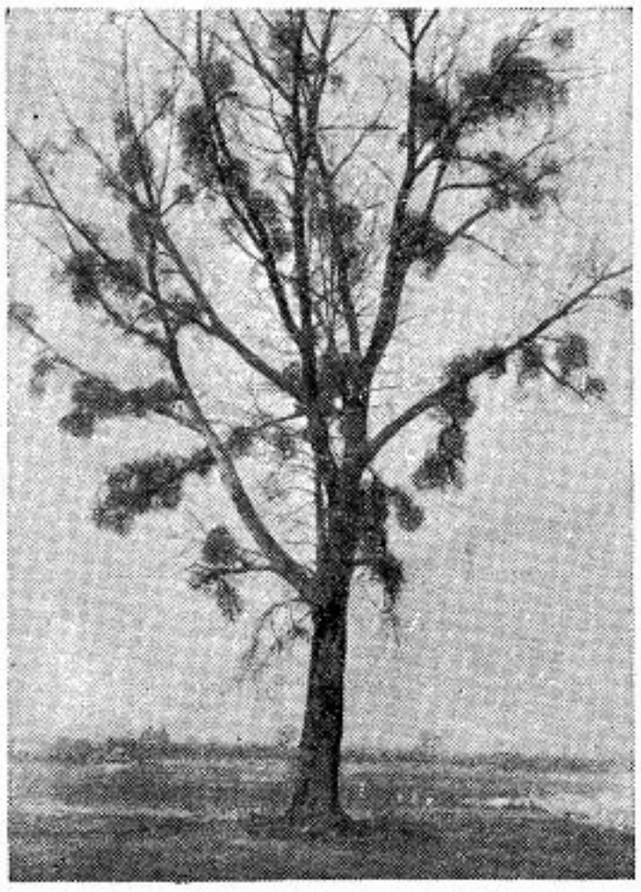


The force exerted by a plant as it grows—a blade of grass that has penetrated a piece of root.

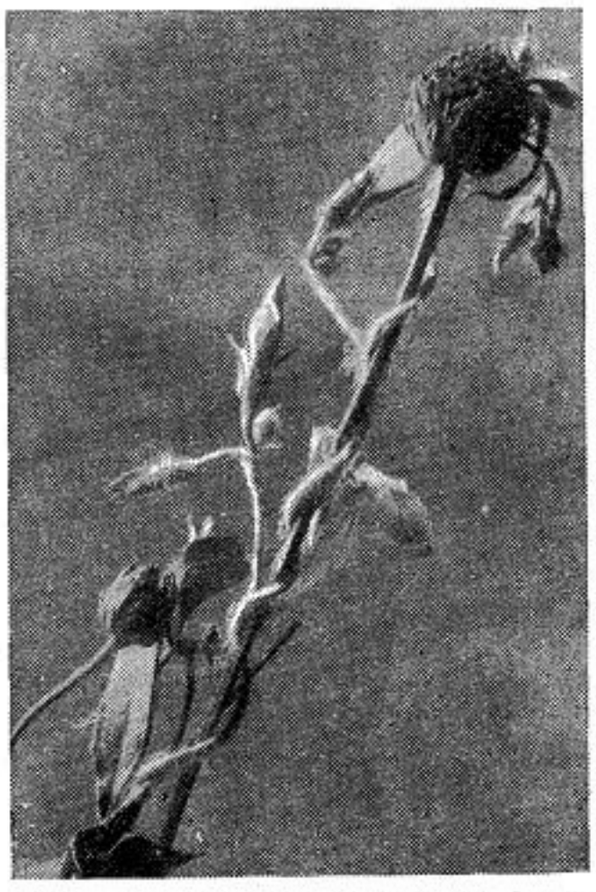
The cup on the stem of a teasel plant that fills with rain and drowns insects that fall in.



The hairs on the stem of the begonia that serve as a rampart against climbing insects.



Clusters of mistletoe, the parasite that makes its home on the oak tree and the apple tree.



The convolvulus, struggling to the sunlight by winding itself round the stem of a neighbour.

In the same way, but less sensationally, insects are captured by the glistening, light-green leaves of the butter-wort, which are so often spread in starfish-like fashion on the sides of the ditches in the bog. The margins of the sticky leaves curl inwards and shut in entangled flies, which are then digested by the secretion of numerous glands on the surface of the leaf. It is interesting to drop a leaf into a test-tube half-full of milk to see the changes.

Another mode of life is thievish, or *parasitic*, when one plant filches food material from another. This is a sort of back-door escape from the struggle for existence. Farmers know that the pasture land is bound to be poor when there is great abundance of the beautiful little flowers called eyebright. And why is this ?

The soil does not yield enough to keep ordinary plants going ; those that get on there must have some peculiarity, such as very long roots, or very much branched roots, and very much cut-up leaves as in millfoil, or very long not-overlapping leaves like grasses. The little eyebright has discovered another way out—hardly worthy of its beauty and its pretty name. It is a root parasite. Some of its rootlets fit on to the rootlets of the grass like a saddle on a horse, and there is absorption of supplies from the grass. This weakens the grass, of course, but it is also an indication that the soil is far from generous.

THE CLIMBING DODDER AND HOW IT STEALS ITS FOOD

The thievish habit seen in the eyebright is found also in the yellow-rattle and in the louse-wort. Farmers say that sheep get out of condition where the louse-wort is very abundant, and they used to blame the plant for giving the sheep lice ! What this means is probably that louse-wort, as a root parasite, manages to thrive in very poor pasture. It is the poverty of the pasture that weakens the sheep.

The dodder is a rather beautiful climbing plant that has lost the usual green pigment called chlorophyll. It twines round the stems of nettles, hops, wheat and other vigorous plants, and sends its suckers into the zone of the stem—the bast—where the nutritive materials manufactured in the leaves pass down to places of storage. The dodder gets its water and salts from the soil, but, being unable to build up carbon compounds on its own account, it steals them from its host. Its life is a stratagem.

Very different is the mistletoe, which has plenty of green pigment, but no connection with the ground. The thrush eats the white berry with its sticky pulp, and the seed, passed through the bird's food canal undigested, is deposited on the branch of a tree, such as an apple or an oak. Sometimes, perhaps, the thrush, having failed to swallow the sticky fruit, wipes its bill on the branch, and the seed is anchored. In any case, the seed of the mistletoe germinates on the branch of a tree, and sends its rootlets into the wood-zone of the stem where the crude sap, consisting of soil-water and dissolved salts, passes up. Being green, the mistletoe plant can make plenty of carbon compounds on its own ; but, having no connection with the earth, it must steal water and salts from its host. These are but three examples of plant parasites—eyebright, dodder, and mistletoe—but they illustrate this seamy side.

THE BIGGEST FLOWER IN THE WORLD AND WHERE IT GROWS

Another possibility in the quest for food is to batten on the dead. Many bacteria, many moulds and rusts, besides some big funguses, live on living plants ; many bacteria and some moulds live on living animals. But others feed on what is dead and rotting, and they are called *saprophytes*. We are familiar with the fungoid plants that feed on decaying leaves and branches, utilising the ready-made organic matter which, being without green pigment, they cannot make for themselves.

Many of these saprophytes play an important part in keeping the earth clean. Among the saprophytes are some flowering plants of high degree which have lost caste and become, to a greater or less extent, dependent upon rotten vegetable matter. The biggest flower in the world (*Rafflesia*), more than a foot across, is the flower of a saprophyte that grows on the floor of the tropical forest.

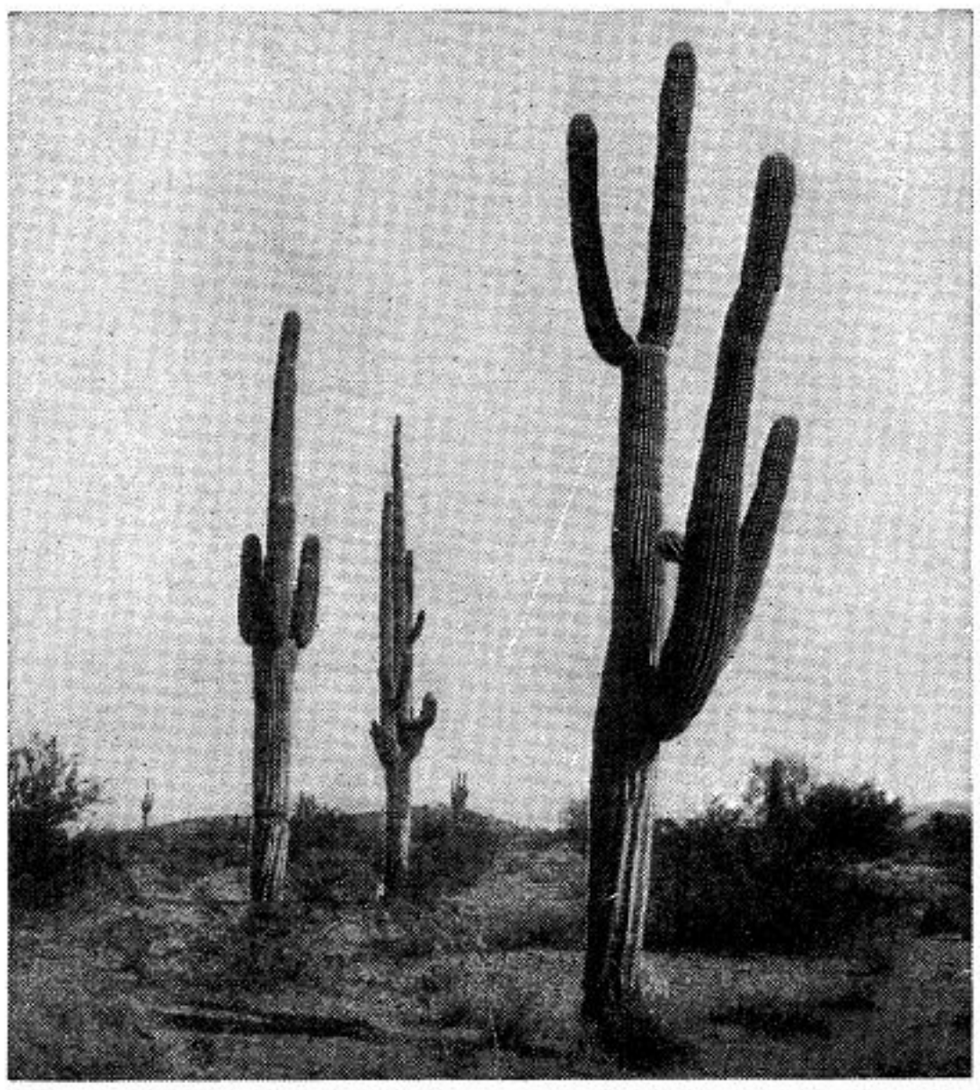
HOW SOME PLANTS ENTER INTO PARTNERSHIP, AND WHY

Let us look for a moment at the very interesting way in which plants enter into partnership with other plants, and occasionally with animals, to the great advantage to both parties ; it is one of the alternatives in the quest for food. There are bacteria which form partnerships with the roots of clovers, peas, lupines, and other plants of the bean family, and enable them, in some mysterious way, to capture and utilise the free nitrogen of the air. There

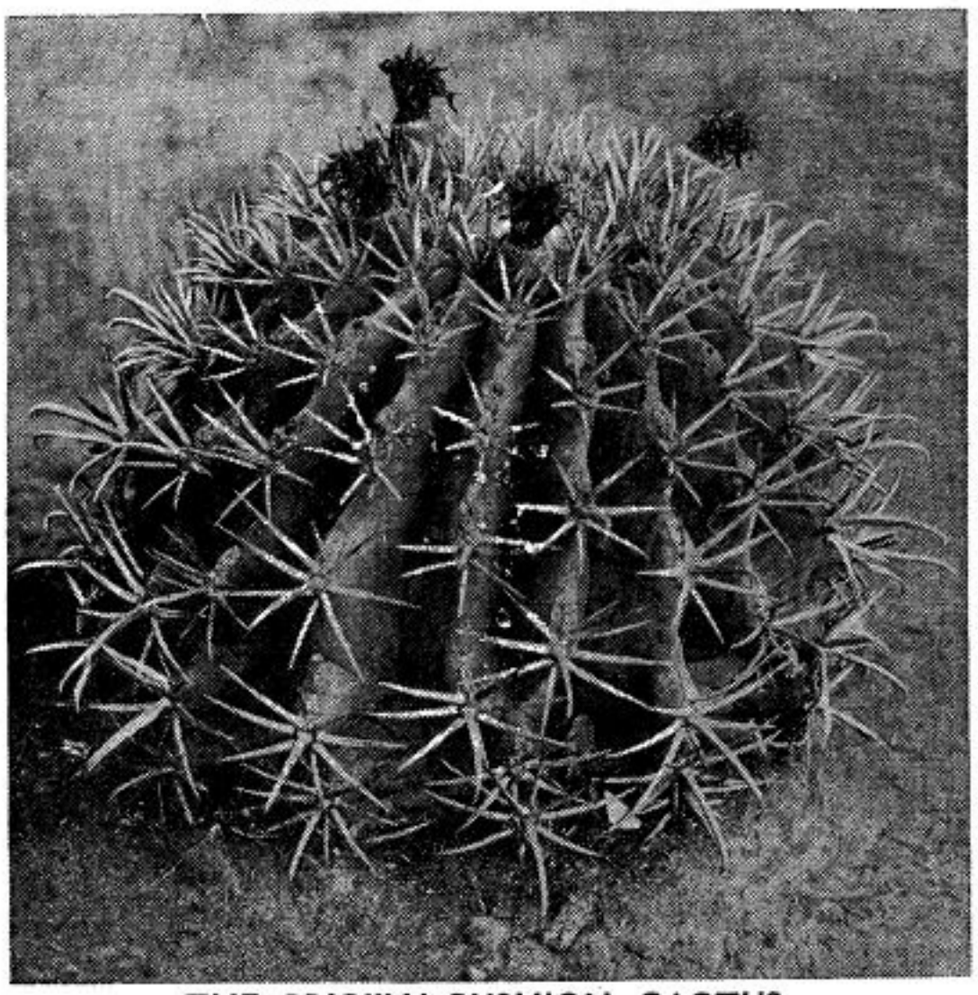
are many fungi which wrap themselves round the roots of plants and form a most useful sponge. The heather gets on well, as we have mentioned, on very poor soil, *because it has a partner-fungus*. This is another solution of natural difficulties.

In the early summer we see men and women busy thinning the turnips with a hoe, destroying ten and leaving one. Sometimes we see women on their knees laboriously thinning or singling out the young carrots. There are too many young plants; they crowd one another and dwarf one another. If the farmer is to get profitable full-grown turnips and carrots, he must single them out. Similarly, in wild nature there is natural thinning. The young plants that get a good start, either through some virtue of their constitution or some accident of environment, elbow out their neighbours. There is ceaseless sifting. As Tennyson said of Nature, "So careful of the race she seems, so careless of the single life."

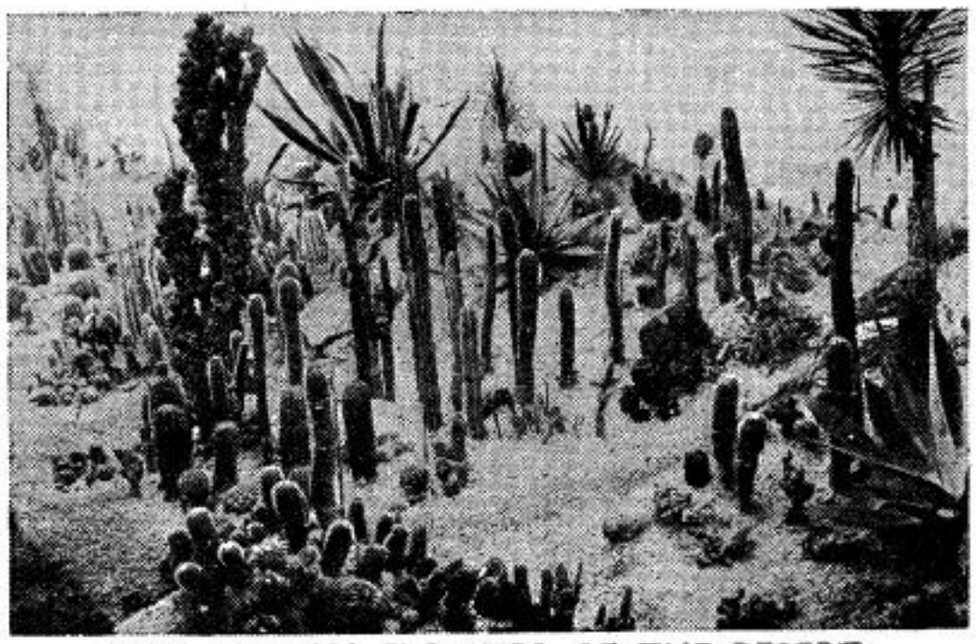
But while the sifting is often effected in early life by a great "infantile mortality" of seedlings, there are



A CACTUS OF ARIZONA WHICH GROWS MORE THAN FORTY FEET HIGH



THE PRICKLY CUSHION CACTUS



THE PRICKLY FLOWERS OF THE DESERT

shelteredandluxurious places where many plants get past the juvenile stages, and where there is extraordinary crowding, and, therefore, great competition for foothold, for light, and for air. Such places are sheltered—self-sown woods, tropical jungles, thick-set hedgerows, and rich meadows. We get a key to what goes on in such places if we realise that plants are struggling, each in its own way and all in the plant's way, to find self-expression, to get on, to obtain satisfaction, or to overcome obstacles and limitations. Let us think of a few of the moves in the life or death game.

What light is shed on the variety of climbing plants when we understand that they are conquerors in a fight! They have remained young and mobile in their stems, or leaf-stalks, or tendrils, or some other part of their body, and they have risen on the shoulders of their neighbours to thrive on fresh air and abundant light.

It is very interesting to think of the different ways in which plants escape from deadly overcrowding and the literal shadow of death. Brambles, with their

long shoots and gripping prickles, are *scramblers*; and so is the Jack-Run-the-Hedge, which is helped by attaching roughness on its rapidly-growing shoots. The ivy is a *root-climber*, giving off numerous brown roots on the shady side of the lanky stem. Then there are *twiners*, with stems that encircle the support, as in the case of honeysuckle and dodder, and the lianas of the tropical forest. But the artists in the business are the *leaf-climbers* and the *tendril-bearers*, where the leaf-stalk, or a specialised sensitive filament, bends round a support. Think of clematis, vine, bryony, and pea; what masterpieces they are!

We see a new significance in the spiral arrangement of leaves on the stem, for this means that they shadow one another less; in the mosaic of leaves on the horse-chestnut branch where many leaves make the most of the available light without overlapping; of the success of long, grassy leaves that run parallel without overlapping; of much cut-up leaves, like millfoil, which have an enormous surface for absorption and exposure to light, like countries with a big coast-line. We must realise the intensity of the struggle. Every meadow is like a tropical jungle, every hedgerow like a tropical forest.

THE MONGOOSE THAT FIGHTS A SNAKE WITH TEETH AND WITS

When man struggles with wild beasts or poisonous serpents or injurious insects, his weapons are often *ideas*. His struggle is rational. When a mongoose fights a snake his weapons are not only teeth but *wits*. His struggle is intelligent. When a mother digger-wasp struggles with a cricket, which she will paralyse to form food for her young ones, her weapons are not only her sting, but that inborn power of doing apparently clever things which we call instinct.

Now, the struggles of plants against animals are at a lower level than all these. There is no reason to believe that the plant ever really *knows* what it is doing, even when it catches a fly, and that is the most active answer-back that a plant ever gives to an animal. In most cases all that we can say is that in the course of time some plants have changed in the direction of having stings or poisons, thorns or spines, hard skins or unpalatable crystals, which have turned out to be very profitable—indeed, life-saving—in warding off the attacks of animals.

The answer-back is an unconscious constitutional change which pays; and sometimes the change occurs without there being, so far as we can see, any need for it. We must not learn what we shall afterwards have to unlearn. The lilies of the field do not toil or spin; and no plant thinks out devices which save its life in the struggle for existence.

THE STRUGGLES OF PLANTS GO ON UNCEASINGLY

To come to the facts of the case, let us give two or three examples of the ways in which many plants are protected from the assaults of animals. Everyone who loves a garden knows that among the worst enemies of plants are the snails and slugs, and their depredations go on all over the world. But there are some plants that snails leave alone, because of hard skins, rough prickles, stiff hairs, poisonous stings, strong odours, and other defences. Thus there are few if any snails that attack the quaint plant of the woods called Cuckoo-pint or Lords-and-Ladies; and one good reason for this is that the leaves are crowded with minute sharp crystals which would pierce and irritate the lips of the snail.

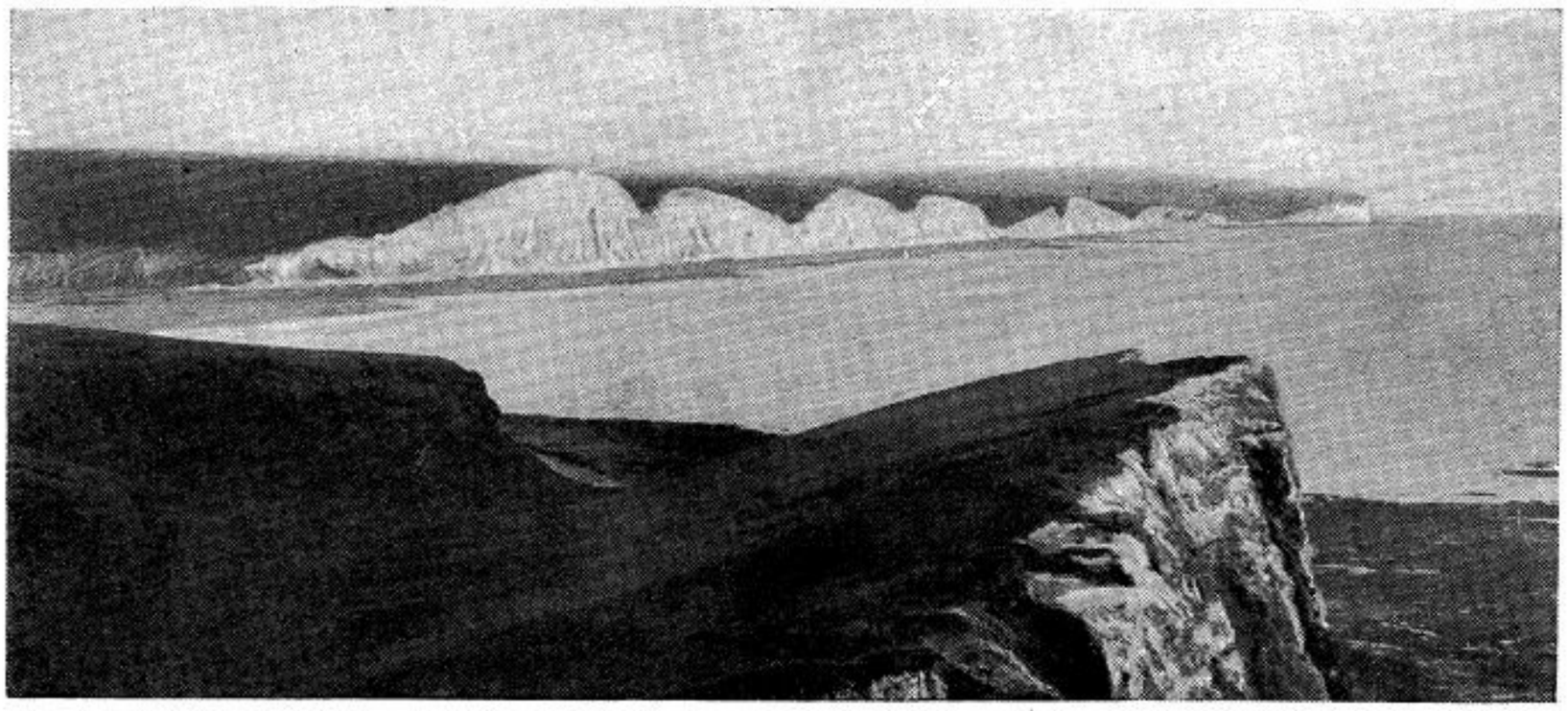
The struggles of plants are world-wide, rarely ceasing, and many-sided. They include all the answers-back, all the thrusts and parries, that plants make against the difficulties and limitations that beset them. There are struggles with Fate—the physical world; struggles with Fellows—other plants in the crowded area; and struggles with Foes—hungry and injurious animals of high and low degree. There is struggle for food, for foothold, for freshness, for light, for moisture—for everything a plant needs. There are ways of evading the intensity of struggle—as for instance, by becoming a parasite, but this usually means some degree of degeneration.

THE FIGHT FOR THE PLACE OF A PLANT IN THE SUN

The great fact for plants and animals is the same—that success means struggle. Not only must plants struggle to win a place in the sun; they have often to struggle to keep it.

But struggle among plants is usually a dreamy business; it includes all the answers-back that it is in them to make, as they care for themselves and for their race. The central principle of all life that goes forward is: *Test all things, and hold fast that which is good.*

The Story of the Peoples of All Nations and Their Homelands



OUR HOMELAND

A SURVEY OF THE BRITISH ISLES

It is natural for people of all nations to love the land in which they were born, and it is more than natural for us, for there is no land like ours.

Here we have gained our early knowledge of life. Other places, more beautiful perhaps in some ways, we do not know till later, but by that time the love of our homeland is fixed. Let us, then, consider why our Homeland should be admired and loved; let us glance over its several parts, recall what they have been, outline what its people have done, are doing, and are hoping to do in friendship with all other nations.

We will make our approach by the English Channel. Most people returning home, and foreigners who come to see us, land at Plymouth or Southampton or Dover as the quickest route to London, the world's greatest city. Of course, ports of the Rivers Mersey, Clyde, Tyne, and Humber receive other contingents of arrivals, but the Channel is the chief sea-way for travellers.

By it the traveller sights the part of the land where its earliest history begins. The Channel route is a historical panorama. For many centuries the national story centred on southern England. Long before Julius Caesar briefly raided the south of Britain the civilised nations round the Mediterranean Sea knew of island lands beyond the Pillars of Hercules where much-needed metals abounded, and their most adventurous mariners braved the stormy seas outside the Gibraltar Strait to secure those treasures. A sense of great age pervades the jutting corner which south-western England thrusts into the broad Atlantic.

Whether it is seen from the land or is approached by sea the Land's End of Cornwall seems to be possessed by a gaunt eeriness. In early times that jagged rock-bound coast was strewn with wrecks. Now warning lighthouses surmounting outlying rocks and lofty headlands flash a welcome across the seas, but the whole region, though inhabited by a most friendly race, seems old and grim. That it is so is not surprising. It is the only part of England where the ancient British still predominate.

For about four centuries, while the legions of ancient Rome garrisoned the southern part of Britain, as part of the Roman Empire, the Celtic and earlier British were protected from other invaders. Then, through six centuries after the Romans went away, nearly all that is now England and southern Scotland was largely re-peopled by invaders from northern Europe (Saxons, Danes,

and Norwegians), and, though there has been much intermixture with the earlier Britishers, the bulk of the present English and Scottish people are descendants of these pagan northern sea-rovers, and the earlier Britons have only held their own in the peninsula of Cornwall, the mountains of Wales, and the Scottish Highlands. Wherever we go we shall find signs that the people of this varied and delightful land have been gradually mixed from several human sources through thousands of years, beginning long before the arrival of those who are commonly known to us as Ancient Britons.

THE DIM UNREADABLE STORY OF OUR HOMELAND'S VANISHED LIFE

We shall miss much of the romance of our Motherland if we do not feel that behind her known history there is a dim unreadable story of vanished life. All the way up the English Channel from Cornwall to Kent, high on the Moors and Downs which rise behind the rocky coast, are many remains of earthen fortresses or camps of refuge whose first builders are not clearly known. Some of these defensive works were occupied by the Roman legions in the course of the first four centuries after Christ and later served in turn as battlegrounds for Saxons and Northmen through 600 more years of recurrent strife. Some of them had marked the lines of defence of tribes who had held the land long before the Romans came, tribes that had been only partly superseded by the Celtic Ancient Britons.

IMPRESSIONS OF THE TRAVELLER COMING FROM THE SOUTH COAST

Whether anyone lands in Southern England at Falmouth in Cornwall, or at Plymouth in Western Devon, at Weymouth in Dorset, Southampton in Hampshire, or Dover in Kent, and proceeds to London by air, or rail, or road, two or three clear impressions will be received from the changeful landscape. One is that of neatness and finish in the farming of the land. It is the tidiest of countries.

The fields are small and edged by hedges in the lower lands, or by stone walls in hillier parts. The villages, mostly in wooded recesses, are homely and cosy, and the little gardens are adorned with flowers. Another broad effect is that of a tree-clad countryside. Trees are sprinkled wherever there are hedgerows. A further impression is that, while all farmed lands are trim, there are considerable portions of open, hilly grazing grounds with an almost primeval wildness.

One sees patches of this character in Cornwall, particularly the central knot of Bodmin Moor, with its rocky crowns of Brown Willy and Row Tor. We pass at once from the cultivated to the wild.

It is the same with Dartmoor, the central mass of Devonshire, with its granite tors and lonely, peaty, hilly expanses, the source of many little rivers, and a common grazing ground for sheep, cattle, and ponies. Somerset has the broad, lofty, heathery, combe-trenched Exmoor, and the sudden gorge-gashed Mendip plateau; Dorset has breezy embattled heights, and on lower levels darkly ancient heathlands. Wiltshire and Berkshire have their grazing Downs, Hampshire its Forest venerable with age, and Sussex, Surrey, and Kent vie with each other in their alternations of noble Downs and gracious woodlands.

WHY THE SOUTH IS SO LARGELY A HOLIDAY-MAKER'S REGION

This southern expanse of England, benevolent in climate, has become in a large degree a holiday-maker's region. The whole coast from the North Foreland to the Land's End, in town and village, offers a welcome to people in search of relaxation or of quiet retirement. Its people, in the main, are of the Saxon variety, softer in speech and manner and more restful than the breeds of the more rugged North. In recent changeful times they have, on the whole, been more quietly prosperous than the strenuous manufacturing folk of the crowded North, and there are some signs of a business drift southward, but the chief centres of southern population are still all connected with the sea, either as seaports or as naval stations, or as health resorts.

In all this southern district there is no concentration on distinctive manufactures similar to the industrial Midlands and the North. It is a continuous range of pleasant scenery, with quick diversity from open sheep-rearing Downs to fertile valleys where dairying and orchards seem to be the commonest interests, though in parts there is a good deal of corn grown on the Downs, even on Salisbury Plain, which once was chiefly a sheep run.

In very early times the central parts of these counties, between hills near the coast and the bare Downs farther inland, were densely wooded, and the forests served as a protection against invaders.

The easy ways of travel then lay high on the hills, the Wiltshire hills having a central position. The middle of Somerset was swampy. Eastern Hampshire, Sussex, and western Kent had an almost continuous forest, and in Sussex particularly at a later period the woods were burned in smelting the iron that was then fairly abundant in the county. But the metal wealth of the South, such as Sussex iron and the Mendip lead in Somerset worked by the Romans, is now almost exhausted, except in Cornwall. Coal, however, is worked in Somerset and in Kent.

There is valuable quarrying for stone of various kinds such as granite, slate, and building stone—Bath, Portland and Purbeck—and for china clay, in Cornwall, Devon, Somerset, Dorset, and Wiltshire, but the main resources of all these southern counties are drawn from the land and sea, and from entertaining visitors who live in less genial parts of the homelands.

WHEN THE ANGLO-SAXONS GRADUALLY HUSTLED THE BRITONS WESTWARD

The distinctions of the British southlands are that they have on the whole a softer beauty than any other large areas of England. Historically they form the base of the British pyramid. They were the most civilised parts of Britain when the Roman Empire introduced its civilisation, and when the Empire collapsed in Britain our invading Anglo-Saxon forefathers, coming in pirate swarms, gradually hustled the Celtic Britons westward as the Celts had before hustled the earlier Iberian invaders into the mountains.

It was on the southern Downs and in these wooded valleys that the first English settled as cultivators of the soil, became Christianised, and in their turn helped to check the later invasions of the pagan Northmen who were endeavouring to uproot Christianity, finally absorbing them into the Christian system. The fabled Celtic King Arthur and the much more substantial King Alfred each played his part in this region. Winchester as capital of Wessex when Wessex was a kingdom divided with London the claim to be the capital of England.

The influence of the South in the religious life of our country is reflected in the fine list of its ancient cathedrals: Canterbury, Rochester, Winchester, Salisbury, Chichester, Wells, and Exeter, to which have been added Truro and Portsmouth in modern times. It is a noble array, but is very far from exhausting the national record.

London, incomparably the most important city in the world in many ways (historical, financial, political, commercial, and industrial, to mention only a few), began its career in a rather obscure way. It was not at once made a capital city.

THE CHIEF CENTRES OF CELTIC POWER BEFORE THE ROMANS CAME

The chief power of the Celtic rulers in Britain before the Romans arrived to conquer it was massed a little way north and east of the Thames and London, at St Albans in Hertfordshire and at Colchester in Essex. The Romans went straight for those strongholds, took them, fortified them in their own way, and garrisoned them. Then they found that the easiest way of bringing up their supplies and supports was to sail up the chief waterway, the Thames, as far as the pool below the present site of London Bridge. There they developed a thriving seaport and made it a walled town where the old City of London now stands, and from it they began their wonderful system of roads.

It is still a thriving port, but much else besides. Twenty million tons of shipping arrive in it yearly. But it is also the place of consultation for the government of a worldwide Empire, whose aim is to lead all nations toward prosperity through peace, cooperation, and friendship.

LONDON, ITS TEEMING MILLIONS, AND ITS VAST TRADE AND VARIED INDUSTRIES

Increasingly it is a centre for an immense variety of miscellaneous manufactures as well as a place of storage and sale for materials from all the world. Its population is more than eight millions, and that does not include a vast and ever-increasing number whose work is in London but whose residences are outside its official borders. There are other great British centres of specially organised industries, as we shall see, but none is so impressive as London, and all the rest of our industrial centres maintain close affiliation with it in business.

The wonderful changes made in transport during the present century, particularly by road, have amazingly affected London. The country year by year knows more of London, but in a far greater degree London knows more about the country.

The way in which Londoners spread themselves week by week in rambles over the neighbouring counties, or by car or cycle rush to the nearest seaside, is one of the most hopeful signs of the times, and must lead to a greater and deeper love of the beauty of our Homeland, especially after the crazy devotion to more speed has worked itself out and become exposed in all its senselessness.

THE LONG-FAMED HIGHWAY OF THE GREAT NORTH ROAD

Sooner or later it will become plain to the most feeble-minded and the most reckless that sheer speed is utterly contrary to all true love of Nature.

We have reached London by way of the southern counties bordering the English Channel, and we will leave it northward to glance at the counties eastward of the Great North Road, and those on that long-famed highway. Essex, Suffolk, and Norfolk, the coastal counties between the Thames and the Wash, formed the East Anglia of our forefathers from whom the name England is inherited.

East Anglia, the kingdom of the Anglians, was not a very stable kingdom, for it readily accepted the sovereignty of either Mercia or of Wessex, as those neighbour kingdoms rose above it in power and prestige. The most sensational history of the region came about 400 years before the Angles arrived. The chief power of the Celtic British centred on Essex when first the Romans came.

THE REBELLION OF BOADICEA AND HER DEFEAT BY THE ROMANS

After they thought themselves firmly established there, and, contrary to the Roman custom, began to act tyrannically, Boadicea, Queen of the Iceni tribe in Norfolk, rose in fierce rebellion, recaptured Colchester, St Albans, and London from the Romans, burned them, and massacred many thousands of Romans and their British friends. The chief Roman general, Suetonius, was far away in Anglesey, uprooting the evil power of the priestly Druids. Returning, he utterly defeated Boadicea and restored the Roman power. But that did not satisfy the Roman sense of justice. Suetonius had won a great victory, but he was ordered to return to Rome and was reprimanded for allowing the misgovernment that had caused the rebellion. In the meantime Boadicea had poisoned herself.

The Essex side of London is the one where the greatest population lives just over the border outside the City. There at least 700,000 people live in boroughs close to the boundary. They are largely engaged in producing a wide variety of manufactures. The most striking of these developments is the town of Dagenham, engaged in constructing motor-cars. There are large residential extensions in the neighbourhood of Epping Forest. Essex was formerly almost covered with woodlands of which Epping Forest, though much reduced, is the principal survivor, and an inestimable boon to the East End of London.

Neither Essex nor Suffolk nor Norfolk can be generally said to vie with the southern counties in regard to natural beauty, but they are very valuable from an agricultural point of wiew.

THE CORNLANDS OF ESSEX WHICH HAVE HELPED TO FEED LONDON

Essex has strong cornlands and has played a big part in feeding London through a long past. Its towns, Colchester and Chelmsford, away from the London area, have a fine history. The county shares with Suffolk the sweet scenery of the River Stour that found an interpreter in Constable, the most English of painters, who was a Suffolk man. Ipswich, the county town of East Suffolk, and Bury St Edmunds, the county town of West Suffolk, have much historical interest.

Cardinal Wolsey was born in Ipswich, George Borrow lived at Oulton Broad, and the county has literary claims through its poets, Edward FitzGerald, who was a native of Woodbridge, and George Crabbe, who was born at Aldeburgh.

Norfolk is a county with strong claims peculiar to itself. It has a great variety of soils, and people who only know one part of it are astonished to hear of the difference in other parts. Viewed as a whole it is a fine agricultural county, with patches of very attractive scenery, including unexpected heathery expanses. The Broads, which are natural widenings of some of its rivers that invite small sailing craft, fascinate many lovers of quiet

holidays. Norwich, the capital, and far the most important city in all the Eastern counties, has been a busy manufacturing centre since the fourteenth century, when it became the pioneer of the new woollen English trade. It has changed its business but has never ceased to be manufacturing as well as agricultural. Its cattle market is the largest in the land.

HOW THE FEN COUNTRY HAS BEEN TRANSFORMED SINCE MONASTIC TIMES

The English coastline between the Thames and the Humber leads the way in the marketing of fish. Cornwall and Devon have their fishing fleets, and each maritime county participates in some degree, but Grimsby, Yarmouth, and Lowestoft dominate the trade, with help in the busiest seasons from Scotland.

Norfolk brings us, at King's Lynn, to the Fen country. It includes all the district of Holland and strips of Norfolk, Lincolnshire, Cambridgeshire, and Huntingdonshire. Nowhere has England changed so much. The Fenland is almost entirely flat, and very little above sea-level. For many centuries it was a swampy plain subject to tidal inundations from four or five considerable rivers, and from floods.

Its villages were built on slight rises: islands in the midst of quagmires. Fishing and fowling were natural occupations, for wild birds abounded. There was much rough vegetation and the floods gradually deposited good soil. Then pious men began as hermits to influence the rude dwellers in these watery wilds, and presently assembling in brotherhoods founded abbeys, began drainage, made roads, and developed fertility in the gloomy fens. After the dissolution of the monasteries, big schemes of drainage were carried out, and now the fens are reclaimed and healthy and grow splendid crops of all kinds. The monks who began this marvellous change long ago are kept in memory by the dignity of many churches they founded in the Lincolnshire fens.

EAST ANGLIA AND ITS PART IN PUBLIC AFFAIRS IN CROMWELL'S TIME

Lincolnshire outside of its fen district has pleasing scenery and skilful agriculture. Its central city, Lincoln, stands out in history as a dominating place toward the North, like Chester, York, and Durham.

Eastern England, over which we have been glancing, played its most conspicuous part in public affairs during the period of the Civil War, when it was almost solidly united in support of Parliament. That was largely owing to the relation of Oliver Cromwell to Huntingdon, his birthplace, his association with Cambridge, and the fact that London, staunchly parliamentarian, traditionally had a powerful influence in Essex, though it did not prevent Colchester from holding out on the other side. London, the East of England, the manufacturing towns, the seaports, and Oliver Cromwell made up the successful opposition to Charles Stuart's methods of government.

The central counties of England to the north of London now feel themselves, as far as Herts, Beds, and Bucks, to be positively residential suburbs of the city.

A CHANGE WHICH ALTERED THE FACE OF MANY PARTS OF ENGLAND

It is not till Northants, Leicestershire, Notts, and Derbyshire are reached that we see how the conditions of work arose in the past which enabled manufactures to be massed in the form of factory production, a change which altered the face of many parts of England. People are still living who can remember woollen garments being made on a machine worked by a man in a cottage.

In the course of a few years no one will be living who can remember any such thing. It was coal that brought the factory into being, and the inventions that work machinery by steam or gas or electricity. It was coal and iron, often found together, that blackened the face of many an English countryside, but also gave the country a long lead in the chief industries of the world. Every one of our large towns that has prosperous manufactures, except Norwich, is either near a coal or an iron deposit, or is on the coast where coal may reach it cheaply. But petrol may be equally used as engine-driving power anywhere, and coal has a dangerous rival until it can be turned into a more handy power. Meantime England and Scotland and Wales have their coal and iron works and their manufactures massed in the neighbourhoods.

Of course agriculture is everywhere, more or less, but there is a considerable difference where minerals are found and worked. There agriculture takes a second place as employing less labour. In the

Midlands there is a mixture between prevailing mineral and manufacturing industry on the one hand and quiet agriculture on the other hand. Northants, like Norwich, has the manufacture of boots and shoes widely spread without having any coalfield, but it has coal-bearing neighbours and a good deal of ironstone. Warwickshire, Leicestershire, Derbyshire, and Nottinghamshire all have coalfields: Warwickshire and Leicestershire each in its north-west, Derbyshire in its east, and Notts in its west. Vigorous manufactures flourish in their principal cities and towns in consequence, with room being left in other parts for delightful unspoiled scenery and distinctive agriculture. Warwickshire has in Birmingham and the towns adjoining it (chiefly in Staffordshire) a remarkable accumulation of metal manufactures, numbering thousands of different articles large and small.

THE FOREST OF ARDEN AND THE GREEN MEADOWS OF STRATFORD

Leicester and Nottingham are cities full of energy and Derby is a great railway centre. But not far away from Birmingham are Shakespeare's Forest of Arden and the green meadows of Stratford-on-Avon, while Leicestershire has, adjoining its coalfield, the granite plateau of Charnwood Forest, the most ancient hills in England, and elsewhere the great hunting grasslands of Melton Mowbray and Market Harborough.

Nottinghamshire's collieries reach the great aristocratic domains of what are known as the Dukeries and Sherwood Forest, the fabled haunt of Robin Hood, and the county has good farming in the lower vale of the Trent.

Derbyshire is halved between a fine coalfield in the valleys of the Rother and the Erewash, and the scenery of the River Derwent and its tributaries, as beautiful as anything to be found anywhere. Thus, in the northern midlands, mining with manufactures is accompanied by agriculture as a secondary.

The great county of Yorkshire is distinguished in agriculture and more distinguished in manufactures. In very early times it was divided into three Ridings, or Thirdings, for convenience in government. The East Riding, which has the fine seaport of Hull as its one centre of population, is entirely occupied with agriculture and seaside relaxation at Bridlington, Filey, and smaller places. Its soil is fertile and its gentle hills, called Wolds, are cultivated to their summits. The North Riding is all the county north of the city of York, and a line eastward to Filey mostly along the Derwent, and a line westward to Westmorland along the southern watershed of the River Ure. The rest of Yorkshire is in the West Riding except York itself. That proud old city is a county to itself and not in any of the Ridings.

THE BUSY TOWNS, FARMLANDS, AND COALFIELDS OF YORKSHIRE

The great agricultural tract of Yorkshire is down the Vale of York in the middle of the county, on either side of the rivers Swale and Ouse as far as the Humber and spreading into all the three Ridings. Near the Humber the lower Vale is fenlike. The city of York, in the middle of the Vale, has long been a notable agricultural centre.

The West Riding and the North Riding are filled on their western side by hill spurs from the Pennine Chain which pour seven rivers eventually into the Humber, and the lower courses of several of these rivers pass, in the West Riding, through the great south-west Yorkshire coalfield. Here has been gathered in nearly the whole of the English woollen manufacture in its many forms, and also other manufactures, by Leeds, Bradford, Huddersfield, Halifax, and many other towns.

When England began to make its own cloth instead of selling its wool abroad to be made up there the trade started in the eastern counties and passed on gradually to the west, near the Cotswold district, where indeed some forms of cloth are still made; but west Yorkshire has become the chief centre of the manufacture, and England is the greatest purchaser of the world's wool. Here we see the massing of men together in large numbers for a single purpose which is the most distinctive feature of modern life.

SHEFFIELD'S WORLDWIDE FAME AS A CENTRE OF THE STEEL INDUSTRY

Another Yorkshire instance of the same tendency is the steel trade in all its branches.

More than 500 years ago Sheffield, in south Yorkshire, was known widely in England for its steel tools, and its fame for the most valuable forms of steel is now worldwide. Similarly the iron

industry is specialised in various districts such as Staffordshire, the north-east (Cleveland) corner of Yorkshire, South Wales, and the north-west corner of Lincolnshire. There is concentration in the most suitable places, formation of huge firms, and the absorption of smaller firms in smaller towns. Agriculture is everywhere, and much of the machinery of agriculture has been made by famous country firms in comparatively small towns, such as Ipswich, Bedford, Grantham, and Gainsborough, but large mass production is swallowing up local industries, which are regulated and reconstructed till they cease to exist, and unemployment is fed. Then the big businesses tend to kill each other. This is not, however, how this country won her place at the head of the world's trade.

CHARMING WOODLAND SCENERY AND LOFTY MOORLAND SOLITUDES

Manufacturing towns are rarely attractive anywhere, but those in the West Riding have alleviations not far away. Nearly all the middle courses of the Yorkshire rivers have charming patches of woodland scenery, and their upper courses come from lofty moorland solitudes. Nidderdale, Wharfedale, and upper Airedale are fine rambling grounds, as also are Wensleydale and Swaledale in the North Riding, and the dales inland from Whitby drained by the Derwent and its tributaries.

Durham, with fine scenery in Teesdale, has had a great exportation of coal, and considerable manufactures and shipbuilding from its close connection with the Cleveland iron district, but it has been hard hit by the falling-off in the coal trade owing to decreased demand for both coal and shipping.

THE SCENIC BEAUTIES OF CUMBERLAND AND WESTMORLAND

Northumberland and the great industrial basin of the River Tyne have also felt the same stresses from the same causes, yet Newcastle and Northumberland show no general decline. Nor is it to be expected, for the tenacity which won prosperity for the hardy North after it had several times suffered partial depopulation by wars and repressions is inherent in the race.

The cathedrals of historic note along our northward route from London to the Scottish border are Norwich, Ely, Peterborough, Lincoln, York, and Durham, and, returning southward by a western route, are Carlisle, Chester, Lichfield, Worcester, Hereford, Gloucester, Oxford, and Bristol, all worthy of study.

Cumberland and Westmorland have the supreme distinction of containing, with the Furness part of Lancashire, the most impressive expanse of English scenery, the Lake District. They are both agricultural except that Cumberland has a small coalfield on its coast, also they have a little lead mining. No one can be said to know England who does not know the Lake District and its many forms of beauty and grandeur. Its two largest lakes are in the Furness district of Lancashire, which, outside the lakeland area, has rich deposits of iron that account for the industrial town of Barrow-in-Furness.

Lancashire, the sixth English county in size, has over five millions of inhabitants, or nearly three-quarters of a million more than Yorkshire, which is about three-and-a-half times as big. That is, Lancashire is a mass of towns in about half of its extent, the other half being well farmed. Nowhere else are manufactures and agriculture so contrasted in a single county. The cotton fabrics on the making of which the county chiefly depends are made from material that is all imported.

ONE OF THE MOST VARIED IN SCENERY OF THE ENGLISH COUNTIES

Cheshire, largely manufacturing, has as its capital city Chester, a romantic place that for centuries was a fortress safeguarding England from Welsh invasions. Staffordshire, north and south, is given up to manufactures and mining. Shropshire, one of the most varied in scenery of the English counties, has an historic capital, Shrewsbury, finely placed on a loop of the River Severn. It has in Ludlow Castle the seat of the Lord of the Marches who kept watch upon Wales. The remainder of the western counties, Hereford, Worcester, Gloucester, and Oxford, with the Malvern and Cotswold Hills, are all agricultural, with special charms in their mild airs and subtly English feeling. And so we see England given up in part to agriculture, but crowded where minerals call men together and manufactures are produced to offer to the world. By far the largest English business is agriculture, yet manufactures

support the greater mass of the people and by trade with the world have brought her into touch with all nations.

The problems of our own country are just the same in all parts of the island, in England, in Scotland, and in Wales. Wales is a very beautiful country in almost every part of it, with a people rightly proud of the way in which they have preserved their individuality and language. It is extremely mountainous, but the valleys have good grazing. The farming is chiefly pastoral.

THE COALFIELDS EXTENDING ACROSS NEARLY THE WHOLE OF SOUTH WALES

The mineral resources are a small coalfield in the north, and one of large extent, fine quality, and exceptional thickness across nearly the whole south of the country.

Copper, tin, lead, and ironstone are worked, the latter extensively, and there are valuable slate quarries. The populous part is of course the mining area—Monmouthshire and Glamorgan, with Cardiff, Swansea, and Newport as the principal towns. Nearly a million-and-a-half of the two-and-a-half millions of Welsh people live in the coal-mining districts. The coal of South Wales is particularly suitable for steamships. The use of oil by ships and the lessening of sea transport through the slackening of international trade after the Great War caused much unemployment in the principality after a period when work had been plentiful and wages and prices high.

The 1931 census revealed that, for the the first time in a hundred years the population of Scotland had decreased. The loss was only about 40,000, not one per cent, but it saddened lovers of Scotland. It is a land to be loved. Its beauty, its industry, the splendid progress it made when it had annexed England, and the wonderful part taken by the Scottish race everywhere overseas have commanded the world's attention and admiration.

HOW SCOTLAND HAS HELPED HERSELF TO THE WORLD'S CHIEF BUSINESSES

Three hundred years ago there was not a poorer nation than Scotland. Much of it had not the means then to be anything but poor. However, since coal and metals began to dominate industry, Scotland, having a fair share of both, went ahead comparatively, and Glasgow is our second city in population. The country has all the manufactures its natural resources make possible—iron and steel, railway equipments, woollens, cottons, silk, linen, jute, materials for seafaring, tobacco, spirituous beverages, well spread over the country, and granite and fish from the east coast, papermaking, and the printing of books.

So Scotland may be said to have helped herself freely to all the world's chief businesses, and though a good deal of her land is not available for high-class agriculture she uses what she has that is good so well that, in farming most kinds of crops, in gardening, and in forestry, she gives others instruction. Since the war upset the world by making each nation try to live on itself as far as possible instead of helping and being helped, all have suffered, for the work will not go round. But on second thoughts we need not be saddened about Scotland's slight loss of population; the Scots, having felt the pinch, have had the determination and energy to seek a better prospect elsewhere.

OUR COUNTRY THE MOST UNSELFISH ADVISER AND FRIEND OF THE WORLD

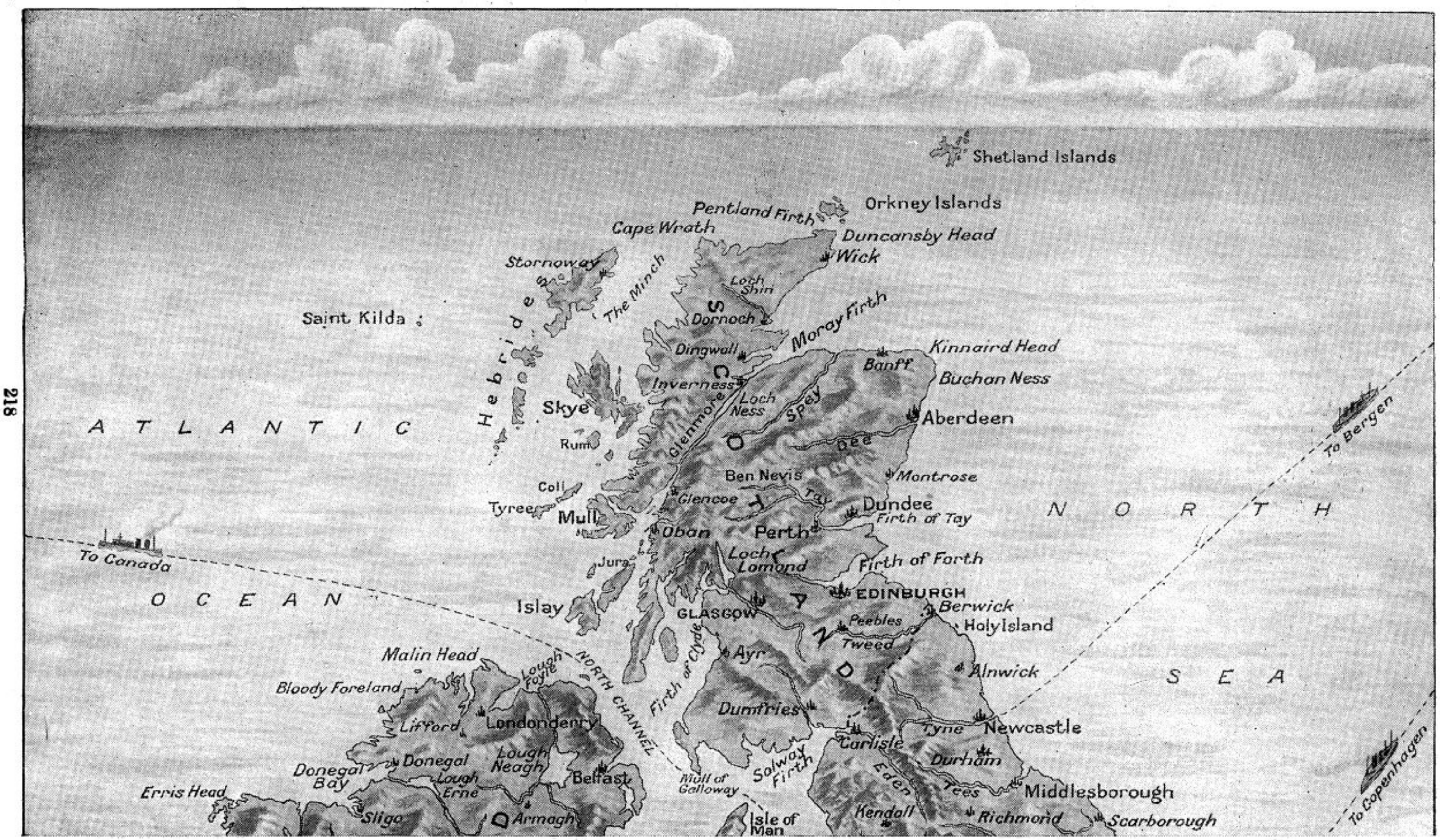
What is the prospect for our country generally now that industry everywhere is showing some dislocation and many are poor? We ought to ask that, for the true test of every nation is the spread of reasonable happiness to all its people.

We have met the shock of changing customs in trade and have kept a larger proportion of our own trade than any other country. Though, like other countries, we have many unemployed, they are fewer in proportion than in other lands. Though work is not available for all a system of helpfulness has been started which ensures that no one shall be left unhelped. No other country has a system so complete or humane. If she has not had the ingenuity to stimulate the wide realm of agriculture, or to suggest how work that needs doing should give employment to the workless, our little island has carried on in public peace, and has retained in the highest degree the respect of the world, which looks up to her as its most unselfish adviser and friend. She has not forfeited the right to her children's love and pride, and she has kept, not only the good faith of our own kindred overseas, but the goodwill and esteem of all fair-minded nations.

Illustrated Maps of All Countries with Thousands of Pictures

ATLAS HOLDING UP THE WORLD

MAP OF THE BRITISH ISLES SHOWING THE HILLS, RIVERS, AND TOWNS

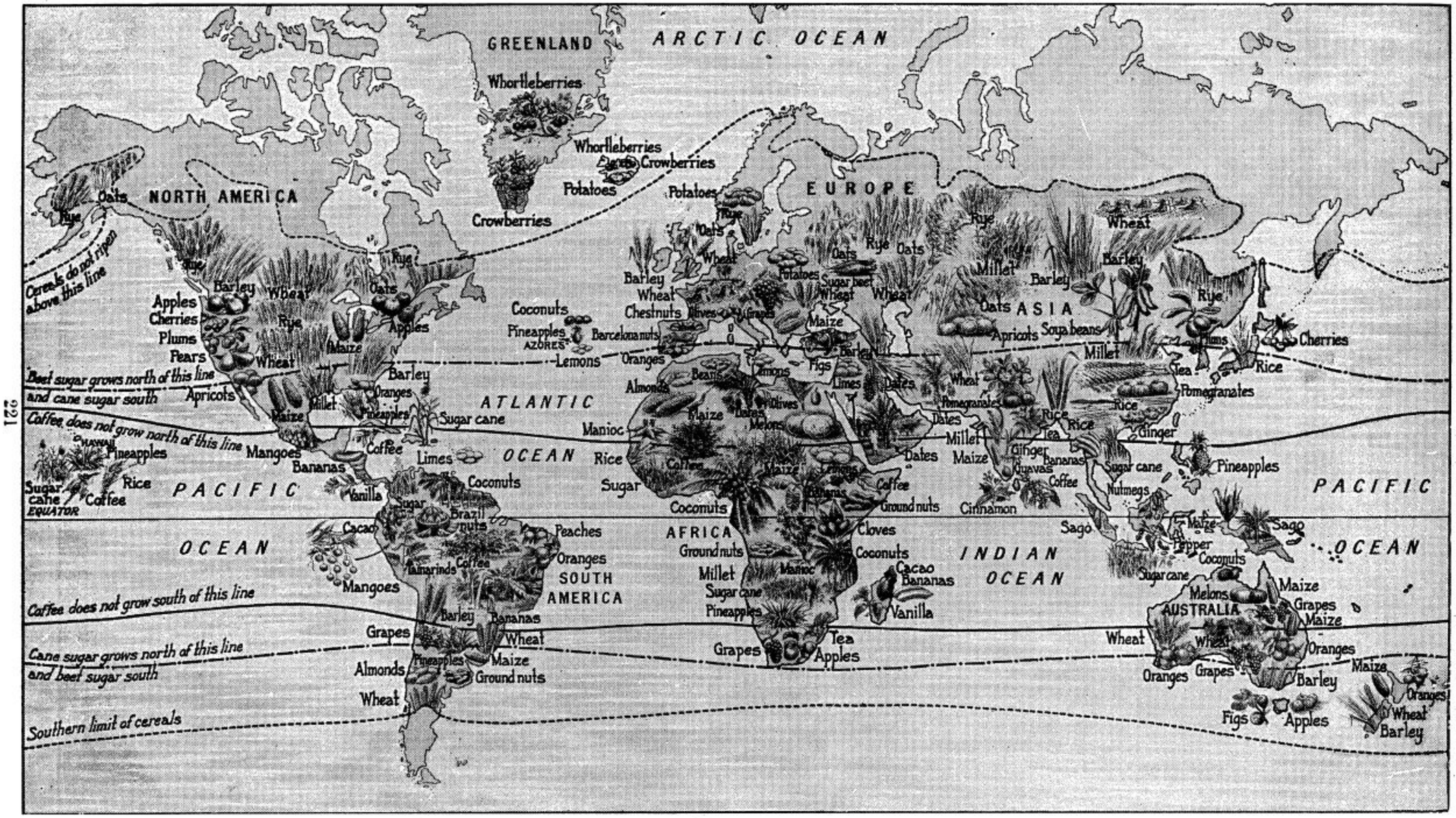


LAND OF OUR BIRTH, WE PLEDGE TO THEE OUR LOVE AND TOIL IN YEARS TO BE

WORLD MAP OF INSECTS THAT HELP & HINDER THE PROGRESS OF MANKIND

THERE ARE OVER 250,000 KINDS OF INSECTS, AND THIS MAP SHOWS THE MOST IMPORTANT OF THOSE THAT WORK FOR AND AGAINST MAN

WORLD MAP OF THE FOOD PLANTS OF MANKIND: FRUITS, NUTS, & CEREALS



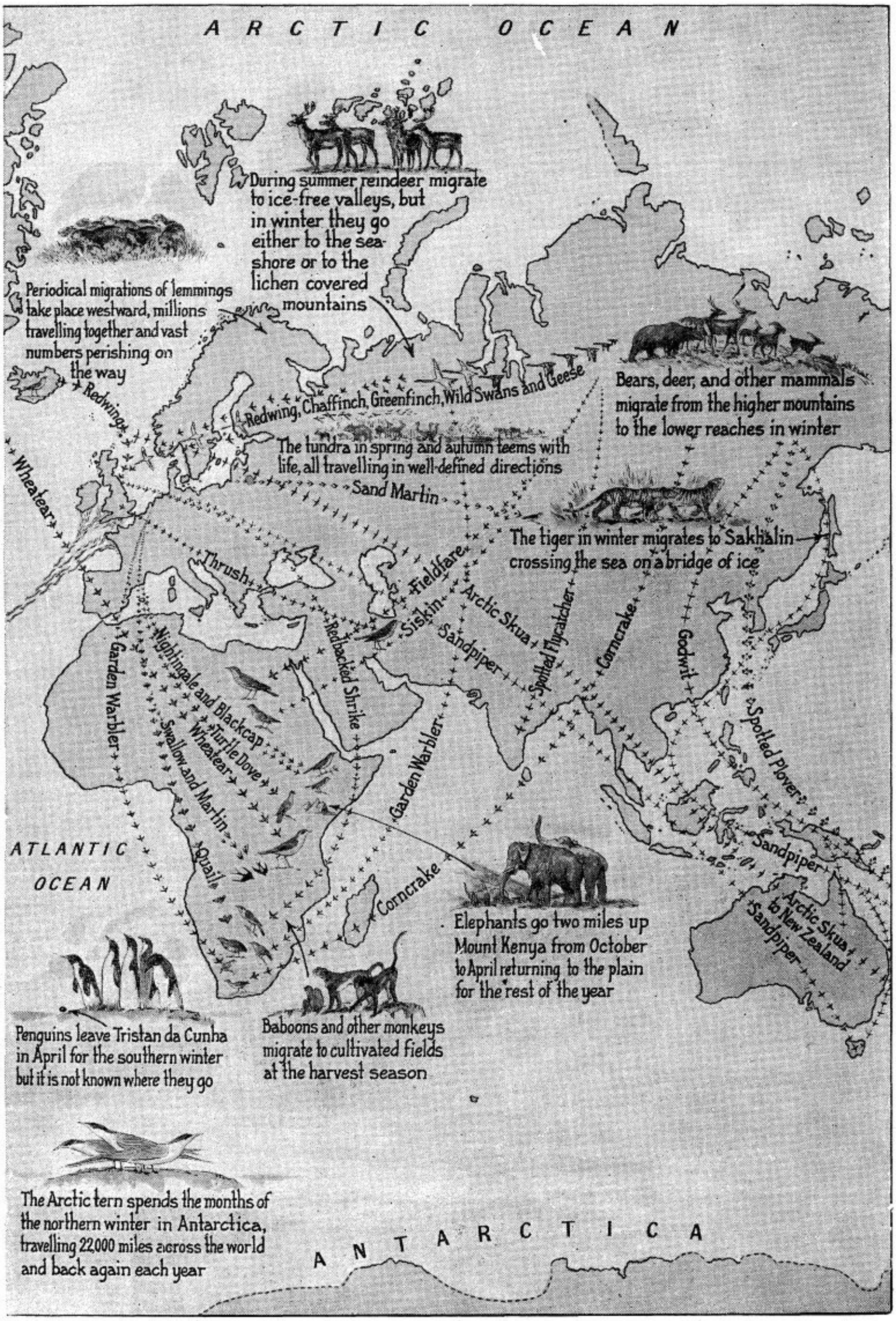
THIS MAP SHOWS THE CHIEF PLANTS YIELDING FOOD FOR MAN, AND WHERE THEY GROW

THE MYSTERIOUS PROCESSIONS OF LIVING

ARCTIC OCEAN
The Arctic tern travels 11,000 miles from its summer home in North America to Antarctica where it remains through the northern winter
In Autumn, reindeer from West Greenland cross on the ice to America where they spend the winter
Caribou move south in winter and return north in spring
Lines of bird migration in North America are east of the Rocky Mountains
Blackpoll
Robin
Whales travel south in winter and north in summer
Golden Plover south route
Golden Plover north route
Crows
Crows
Eels from America
Crows in U.S.A. migrate in two main streams
Eels from Europe
Seals travel north in spring to bring up their families and return south in autumn
HAWAII
Golden Plover flies to Hawaii from Siberia and Alaska for the winter
PACIFIC OCEAN
Spotted Plover
Godwit
Sandpiper
Arctic Skua
Golden Plovers fly to the Pacific Islands from the Far North for the winter
Guanacos migrate to the valleys in April when the snow deepens on the Andes, and return in October each year
Migrating birds arriving in New Zealand from Northern Europe and Asia
ANTARCTIC OCEAN

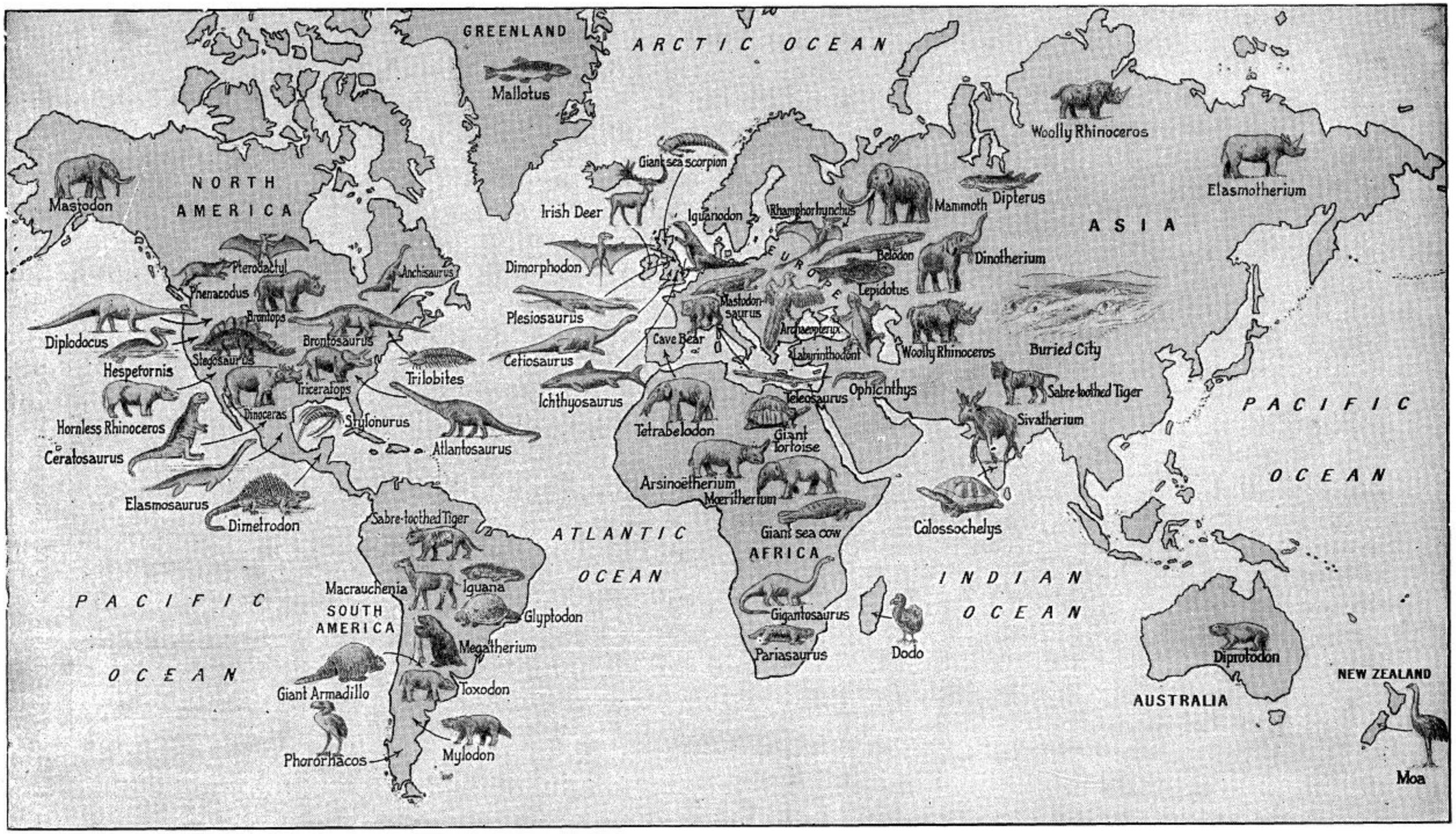
A NATURAL HISTORY MAP SHOWING THE ANNUAL MIGRATIONS OF ANIMALS

CREATURES THAT TAKE PLACE EVERY YEAR


ARCTIC OCEAN
During summer reindeer migrate to ice-free valleys, but in winter they go either to the sea-shore or to the lichen covered mountains
Periodical migrations of lemmings take place westward, millions travelling together and vast numbers perishing on the way
Redwings
Redwing, Chaffinch, Greenfinch, Wild Swans and Geese
Bears, deer, and other mammals migrate from the higher mountains to the lower reaches in winter
The tundra in spring and autumn teems with life, all travelling in well-defined directions
Sand Martin
Wheatear
The tiger in winter migrates to Sakhalin crossing the sea on a bridge of ice
Thrush
Fieldfare
Siskin
Arctic Skua
Sandpiper
Spotted Flycatcher
Corncrake
Godwit
Spotted Plover
Redbacked Shrike
Garden Warbler
Nightingale and Blackcap
Turtle Dove
Wheatear
Swallow and Martin
Quail
Garden Warbler
Sandpiper
Arctic Skua to New Zealand
Sandpiper
ATLANTIC OCEAN
Corncrake
Elephants go two miles up Mount Kenya from October to April returning to the plain for the rest of the year
Penguins leave Tristan da Cunha in April for the southern winter but it is not known where they go
Baboons and other monkeys migrate to cultivated fields at the harvest season
The Arctic tern spends the months of the northern winter in Antarctica, travelling 22,000 miles across the world and back again each year
ANTARCTICA

AND BIRDS, WITH THEIR ROUTES FROM PLACE TO PLACE. See Index for Migration

ANIMALS OF THE LONG AGO & WHERE THEIR REMAINS ARE FOUND TODAY



FOSSIL MAP OF THE WORLD SHOWING WHERE WE FIND THE REMAINS OF THE EXTINCT ANIMALS IN THE PICTURE CLOCK OF LIFE ON PAGE 10

THE BOY AND THE ANGEL

Robert Browning seeks to illustrate in this poem one of the greatest truths of life. The poor boy Theocrite, sincerely praising God each day, foolishly comes to think that God would be better pleased to be praised in the "great way" of the Pope of Rome, and so his ambition is to become the Pope. The poet imagines the angel Gabriel coming down to Earth to take the place of the poor workman Theocrite, while Theocrite has climbed into the papal chair. Thus in the end the angel shames the boy. The lesson is that we are all free to praise God in any way we choose.

MORNING, evening, noon, and night,
"Praise God!" sang Theocrite.

Then to his poor trade he turned,
By which the daily meal was earned.

Hard he laboured, long and well;
O'er his work the boy's curls fell.

But ever, at each period,
He stopped and sang: "Praise God!"

Then back again his curls he threw,
And cheerful turned to work anew.

Said Blaise, the listening monk: "Well done;
I doubt not thou art heard, my son

"As well as if thy voice today
Were praising God the Pope's great way.

"This Easter Day the Pope at Rome
Praises God from Peter's dome."

Said Theocrite: "Would God that I
Might praise Him that great way, and die."

Night passed, day shone,
And Theocrite was gone.

With God a day endures alway,
A thousand years are but a day.

God said in heaven: "Nor day nor night
Now brings the voice of My delight."

Then Gabriel, like a rainbow's birth,
Spread his wings and sank to earth;

Entered, in flesh, the empty cell,
Lived there, and played the craftsman well.

And morning, evening, noon, and night,
Praised God in place of Theocrite.

And from a boy to youth he grew;
The man put off the stripling's hue.

The man matured and fell away
Into the season of decay;

And ever o'er the trade he bent,
And ever lived on earth content.

(He did God's will; to him all one
If on the earth or in the sun.)

God said: "A praise is in mine ear;
There is no doubt in it, no fear:

"So sing old worlds, and so
New worlds that from my footstool go

"Clearer loves sound other ways:
I miss my little human praise."

Then forth sprang Gabriel's wings, off fell
The flesh disguise, remained the cell.

'Twas Easter Day; he flew to Rome,
And paused above Saint Peter's dome.

In the tiring-room close by
The great outer gallery,

With his holy vestments dight,
Stood the new Pope, Theocrite:

And all his past career
Came back upon him clear,

Since when, a boy, he plied his trade,
Till on his life the sickness weighed,

And in his cell, when death drew near,
An angel in a dream brought cheer :

And rising from the sickness drear
He grew a priest, and now stood here.

To the East with praise he turned,
And on his sight the angel burned.

" I bore thee from thy craftsman's cell
And set thee here ; I did not well.

" Vainly I left my angel-sphere,
Vain was thy dream of many a year.

" Thy voice's praise seemed weak ; it dropt :
Creation's chorus stopped !

" Go back and praise again
The early way, while I remain.

" With that weak voice of our disdain,
Take up Creation's pausing strain.

" Back to the cell and poor employ :
Become the craftsman and the boy ! "

Theocrite grew old at home ;
A new Pope dwelt in Peter's dome.

One vanished as the other died :
They sought God side by side.

TO A WATERFOWL

William Cullen Bryant, who was born at Cummington, in the State of Massachusetts, November 3, 1794, and died in New York, June 12, 1878, was one of the greatest poets America has produced. In his poetry we find a deep understanding of Nature and a steady, serene faith in the Providence which guides the wondrous life of earth. The manner of his poetry is, however, rather that of a scholar.

WHITHER, midst falling dew,
While glow the heavens with the last steps of day,
Far, through their rosy depths, dost thou pursue
Thy solitary way ?

Vainly the fowler's eye
Might mark thy distant flight to do thee wrong,
As, darkly painted on the crimson sky,
Thy figure floats along.

Seek'st thou the splashy brink
Of weedy lake, or marge of river wide,
Or where the rocking billows rise and sink
On the chafed ocean-side ?

There is a Power whose care
Teaches thy way along that pathless coast—
The desert and illimitable air—
Lone wandering, but not lost.

All day thy wings have fanned,
At that far height, the cold, thin atmosphere.
Yet stoop not, weary, to the welcome land,
Though the dark night is near.

And soon that toil shall end ;
Soon shalt thou find a summer home and rest,
And scream among thy fellows ; reeds shall bend
Soon o'er thy sheltered nest.

Thou'rt gone, the abyss of heaven
Hath swallowed up thy form ; yet on my heart
Deeply hath sunk the lesson thou hast given,
And shall not soon depart.

He who, from zone to zone,
Guides through the boundless sky thy certain flight,
In the long way that I must tread alone
Will lead my steps aright.

LORD, IT BELONGS NOT TO MY CARE

Richard Baxter (1615–1691), the writer of this hymn, was a famous broad-minded minister, who wrote many books, beautiful in spirit and style, and won universal respect in days when persecution was common. His health was always precarious, and that fact gives these verses their tone, and some of their beauty.

LORD, it belongs not to my care
Whether I die or live ;
To love and serve Thee is my share,
And this Thy grace must give.

If life be long I will be glad
That I may long obey ;
If short—yet why should I be sad
To soar to endless day ?

Christ leads me through no darker rooms
Than He went through before ;
He that into God's kingdom comes
Must enter by His door.

Come, Lord, when grace hath made me meet
Thy blessed face to see ;
For if Thy work on earth be sweet,
What will Thy glory be ?

Then I shall end my sad complaints
And weary, sinful days ;
And join with the triumphant saints
To sing Jehovah's praise.

My knowledge of that life is small,
The eye of faith is dim ;
But 'tis enough that Christ knows all,
And I shall be with Him.

MEMORY

Thomas Bailey Aldrich, a famous American poet, expresses in these lines a curious fact which most people have experienced. Some unimportant events in our lives will be remembered by us far better than we can ever remember dates which are supposed to be of the greatest importance. Perhaps Memory is wiser than we are in thus calling to our mind the things of which we had taken least account.

My mind lets go a thousand things,
Like dates of wars and deaths of kings,
And yet recalls the very hour—
'Twas noon by yonder village tower,
And on the last blue moon in May—
The wind came briskly up this way,
Crisping the brook beside the road;
Then, pausing here, set down its load
Of pine-scents, and shook listlessly
Two petals from that wild-rose tree.

THE VOICE OF THE GRASS

We are not apt to look upon the grass as a thing of life and movement, and yet, of course, it shares the silent, steady life of all the plants. In this little poem, written by Sarah Boyle, the grass is personified as a living thing, with very striking and truthful effect. It is thus that the poet can make us see familiar things in a new light.

Here I come creeping, creeping everywhere;
By the dusty roadside,
On the sunny hillside,
Close by the noisy brook,
In every shady nook,
I come creeping, creeping everywhere.

Here I come creeping, smiling everywhere;
All around the open door,
Where sit the aged poor;
Here where the children play,
In the bright and merry May,
I come creeping, creeping everywhere.

Here I come creeping, creeping everywhere;
In the noisy city street
My pleasant face you'll meet,
Cheering the sick at heart,
Toiling his busy part—
Silently creeping, creeping everywhere.

Here I come creeping, creeping everywhere;
You cannot see me coming,
Nor hear my low, sweet humming;
For in the starry night,
And the glad morning light
I come quietly, creeping everywhere.

Here I come creeping, creeping everywhere
More welcome than the flowers
In summer's pleasant hours;
The gentle cow is glad,
And the merry bird not sad,
To see me creeping, creeping everywhere

Here I come creeping, creeping everywhere;
My humble song of praise,
Most joyfully I raise
To Him at whose command
I beautify the land,
Creeping, silently creeping everywhere.

WHAT I LIVE FOR

George Linnaeus Banks, who was born in 1821 and died in 1881, was well known in his day as a poet and a writer, though the novels of his wife are now more read than his own writings. He was a man of lofty ideals, and endeavoured by voice and pen to forward the education of his fellow-men, for he was an orator as well as a writer. Of his short poems the following is perhaps the best known, and it sums up the life-work of the true Christian. The last four lines form a favourite quotation with writers and speakers pleading for workers to come forward in any good cause.

I LIVE for those who love me,
Whose hearts are kind and true;
For the heaven that smiles above me,
And awaits my spirit, too;
For all human ties that bind me,
For the task by God assigned me,
For the bright hopes left behind me,
And the good that I can do.

I live to learn their story,
Who've suffered for my sake;
To emulate their glory,
And follow in their wake;
Bards, patriots, martyrs, sages,
The noble of all ages,
Whose deeds crown history's pages,
And time's great volume make.

I live to hold communion
With all that is divine;
To feel there is a union
'Twixt Nature's heart and mine;
To profit by affliction,
Reap truths from fields of fiction,
Grow wiser from conviction,
And fulfil each grand design.

I live to hail that season,
By gifted minds foretold,
When men shall live by reason,
And not alone by gold;
When man to man united,
And every wrong thing righted,
The whole world shall be lighted
As Eden was of old.

I live for those who love me,
For those who know me true;
For the heaven that smiles above me,
And awaits my spirit too;
For the cause that lacks assistance,
For the wrong that needs resistance,
For the future in the distance,
And the good that I can do.

IF I SHOULD DIE

The pathos of this beautiful poem is redoubled when we know that the writer, Rupert Brooke, a young officer, lies buried, as he felt he might be, in "some corner of a foreign field," for early in the Great War he fell fighting for the England he loved What could he have left behind more beautiful than this idea of his spirit for ever echoing in the world what is best in England? It is from his Poems, published by Sidgwick and Jackson.

IF I should die, think only this of me :
That there's some corner of a foreign field
That is for ever England. There shall be
In that rich earth a richer dust concealed,
A dust which England bore, shaped, made aware,
Gave, once, her flowers to love, her ways to roam,
A body of England's, breathing English air,
Washed by the rivers, blest by suns of home.
And think this heart, all evil shed away,
A pulse in the eternal mind, no less
Gives somewhere back the thoughts by England given ;
Her sights and sounds ; dreams happy as her day ;
And laughter, learnt of friends ; and gentleness,
In hearts at peace, under an English heaven.

SALLY IN OUR ALLEY

Few songs are better known or more popular than this, supposed to be sung by the apprentice who loves his pretty Sally so dearly, although she *does* live in a humble alley. He will be true to her, too, in spite of the disagreeable neighbours, who "make game" of him and his sweetheart. Of course, Sunday is "the day that comes between a Saturday and Monday." Henry Carey, the author of this song, who died in 1743, was also a musician of some note in his day. It has been said that he wrote the English National Anthem, but the evidence in his favour is not very strong.

OF all the girls that are so smart,
There's none like pretty Sally ;
She is the darling of my heart,
And lives in our alley :
There is no lady in the land
That's half so sweet as Sally ;
She is the darling of my heart,
And lives in our alley.
Of all the days within the week
I dearly love but one day,
And that's the day that comes between
A Saturday and Monday :
Oh ! then I'm dressed in all my best,
To walk abroad with Sally ;
She is the darling of my heart,
And lives in our alley.

When Christmas comes about again,
Oh ! then I shall have money ;
I'll save it up, and box and all
I'll give unto my honey ;
I would it were ten thousand pound,
I'd give it all to Sally ;
She is the darling of my heart,
And she lives in our alley.

My master and the neighbours all
Make game of me and Sally,
And, but for her, I'd better be
A slave and row a galley ;

But when my seven long years are out,
O, then I'll marry Sally ;
O, then we'll wed, and then we'll bed,
But not in our alley.

JOHN ANDERSON

This famous song is a love-song—with a difference. In it Robert Burns pictures a happy couple not at the beginning of their married life, but toward its close ; and it says much for the enduring affection each has cherished for the other that the old lady is able to sing so tenderly of her "jo," or sweetheart. The Scots words in the song are easy to understand, but "brent," it may be said, means smooth, or unwrinkled : "pow," head, and "canty," happy.

JOHN ANDERSON, my jo John,
When we were first acquent
Your locks were like the raven,
Your bonnie brow was brent ;
But now your brow is bald, John,
Your locks are like the snow ;
But blessings on your frosty pow,
John Anderson, my jo.

John Anderson, my jo John,
We clamb the hill thegither,
And mony a canty day, John,
We've had wi' ane anither ;
Now we maun totter down, John,
But hand in hand we'll go,
And sleep thegither at the foot,
John Anderson, my jo.

THE SHEPHERD BOY SINGS IN THE VALLEY OF HUMILIATION

John Bunyan, whose "Pilgrim's Progress" is the greatest allegory in the world, wrote very little verse. But the snatches of poetry he introduced here and there into his story were quaintly expressed. The song which he placed in the mouth of the Shepherd Boy in the Valley of Humiliation, however, is entitled to warm praise, even on the literary side. The lad had already found out the secret of happiness and peace. A contented mind is a continual feast.

HE that is down needs fear no fall,
He that is low no pride ;
He that is humble ever shall
Have God to be his guide.

I am content with what I have,
Little be it or much ;
And, Lord, contentment still I crave,
Because Thou savest such.

Fulness to such a burden is
That go on pilgrimage ;
Here little, and hereafter bliss,
Is best from age to age.

GOOSEY GOOSEY GANDER

Goosey, Goosey, Gan - der, Whither shall I wander ?
Up - stairs and down - stairs and in my lady's chamber.
There I met an old man who wouldn't say his prayers; I
took him by the left leg and threw him down the stairs

HIGGLEDY, Piggledy,
My black hen,
She lays eggs
For gentlemen ;
Sometimes nine,
And sometimes ten,
Higgledy, Piggledy,
My black hen.

HERE we go up, up, up,
And here we go down, down, downy ;
And here we go backwards and forwards,
And here we go round, round, roundy.

PEASE-PUDDING hot,
Pease-pudding cold,
Pease-pudding in the pot.
Nine days old.
Some like it hot,
Some like it cold,
Some like it in the pot,
Nine days old.

HERE we go round a ginger ring,
A ginger ring, a ginger ring ;
Here we go round a ginger ring,
Around about merry my Tansy.

A bowlful of nuts we sat down to crack,
Sat down to crack, sat down to crack ;
A bowlful of nuts we sat down to crack,
Around about merry my Tansy.

What will you give us to tell his name,
To tell his name, to tell his name;
What will you give us to tell his name,
Around about merry my Tansy ?

The last time is the catching time,
The catching time, the catching time ;
The last time is the catching time,
Around about merry my Tansy.

JACK SPRAT had a pig, who was not very little nor yet very big ;
He was not very lean, he was not very fat ;
He'll do well for a grunt, says little Jack Sprat.

GO to bed first,
A golden purse ;
Go to bed second,
A golden pheasant ;
Go to bed third,
A golden bird.

PLEASE to remember
The fifth of November,
Gunpowder, treason, and plot ;
I know no reason
Why gunpowder and treason
Should ever be forgot.

WHEN little Sammy Soapsuds
Went out to take a ride,
In looking over London Bridge
He fell into the tide.

His parents never having taught
Their loving Sam to swim,
The tide soon got the mastery,
And made an end of him

DANCE, little baby, dance up high,
Never mind, baby, mother is by ;
Crow and caper, caper and crow,
There, little baby, there you go ;
Up to the ceiling, down to the ground,
Backwards and forwards, round and round ;
Dance, little baby, and mother will sing,
With the merry coral, ding, ding, ding!

ONE misty, moisty morning,
When cloudy was the weather,
There I met an old man,
Clothed all in leather ;
Clothed all in leather,
With cap under his chin—
How do you do, and how do you do,
And how do you do again ?

HERE'S Sulky Sue ;
What shall we do ?
Turn her face to the wall
Till she comes to.

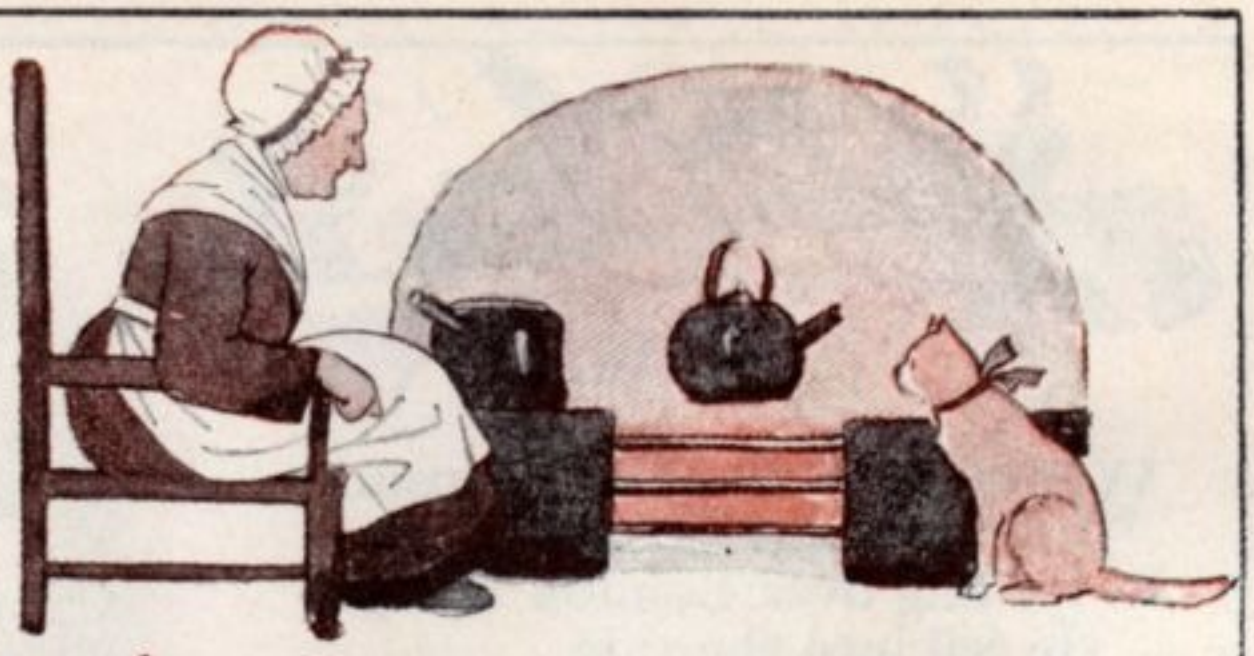
COME, let's to bed,
Says Sleepy-head,
Tarry a while, says Slow,
Put on the pan, says Greedy Nan,
Let's sup before we go.

RUB-A-DUB-DUB,
Three men in a tub ;
The butcher, the baker,
The candlestick-maker ;
And they all jumped out of a rotten potato.

Sybil Burnside

DAME TROT and her cat
Sat down for to chat;
The Dame sat on this side.
And Puss sat on that.

Puss, says the Dame,
Can you catch a rat
Or a mouse in the dark?
Purr! says the cat.

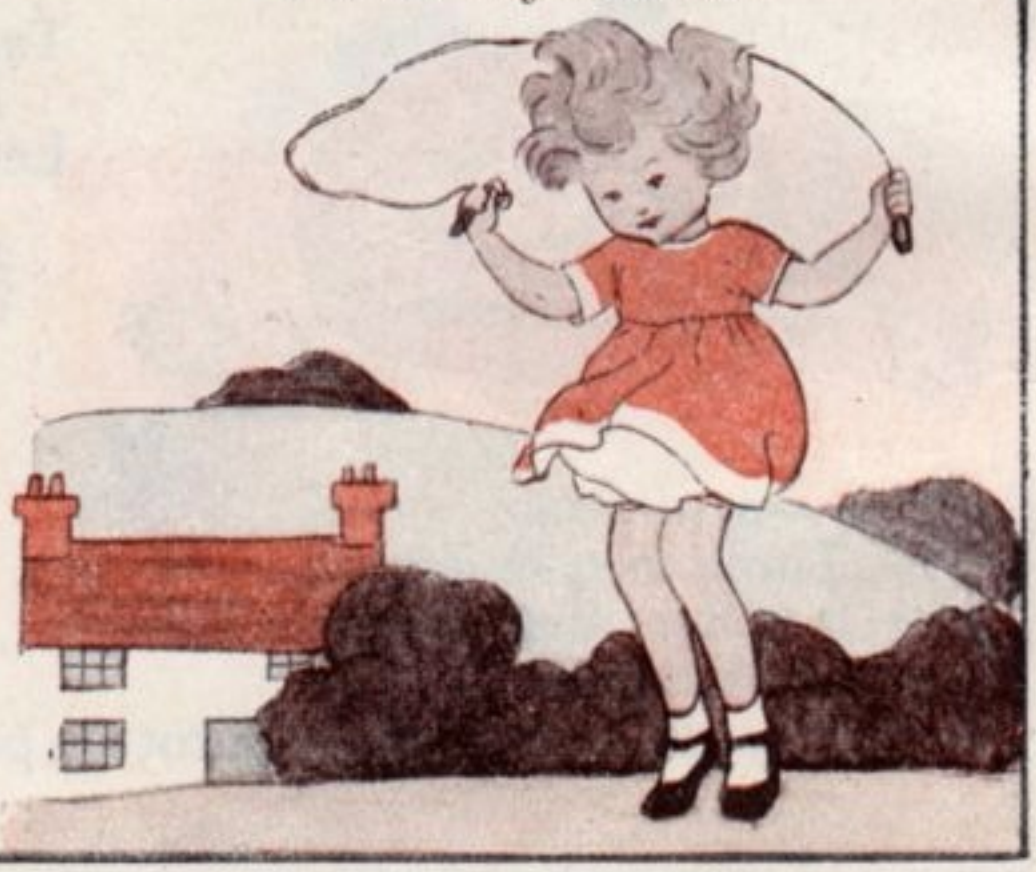


LITTLE Tom Tucker
Sings for his supper;
What shall he eat?
White bread and butter.
How shall he cut it
Without a knife?
How can he marry
Without a wife?

ROBERT BARNES, fellow fine,
Can you shoe this horse of mine?
Yes, good sir, that I can,
As well as any other man.
Here's a nail and there's a prod,
And now, good sir, your horse is shod.

THERE was an old woman
Lived under a hill,
And if she's not gone
She lives there still.

HERE am I, little Jumping Joan;
When nobody's with me
I'm always alone.



THERE was an owl lived in an oak:
Whiskey, whaskey, weedle!
And all the words he ever spoke
Were fiddle, faddle, feedle!

A gunner chanced to come that road:
Whiskey, whaskey, weedle!
Says he, I'll shoot you, silly bird!
So fiddle, faddle, feedle!

The Story of Where Power Comes From, What It Does, & How It Works

Syrian women with their distaffs

WHAT IS ELECTRICITY?

THE first kind of electricity that was known was the kind produced by friction. In ancient Syria the women often used for their spinning distaffs made of amber, and the spindles as they ran merrily round, would often touch against the garment of the spinner and become electrified. Then, when placed on the ground, they would attract dry leaves or dust, which would cling to them with a mysterious force.

All unconsciously these spinning-women were driving an *electrical machine*, making the electricity which thousands of years later was to light the homes of the people. Take a glass rod or a fountain-pen, rub it briskly with a silk handkerchief, and hold it over some tiny pieces of tissue-paper. The bits of paper will suddenly becoming lively; they will move about and jump up to meet the rod, clinging to it by what is known as electric attraction.

Some three hundred years or so before the birth of Jesus, one of the early philosophers of Greece, Theophrastus, found out that some unknown force must be at work when amber was excited by friction, and, as far as we know, his thoughts were the first to be directed on any sort of scientific lines to this curious phenomenon. Experiments began, and Theophrastus found that amber was not alone in this power but that it was possessed also by a mineral called tourmaline. Pliny, seventy years after Christ, again drew attention to these things, and followed up the early studies of Theophrastus.

Many other evidences of the existence of the same sort of curious force were noticed later; probably they were not really new, but men had begun to link up these various happenings, and to seek some explanation of them. Aristotle tells us how the " torpedo fish " would benumb both men and fishes. This curious creature has an organ with which it produces electricity, and it can benumb another fish with a powerful shock by merely touching it. The electric eel has similar powers; in fact, several varieties of these remarkable fishes are now known.

An interesting fact can now be recorded: the first endeavours of man to put electricity to any real use. These electric fishes were actually used to give shocks to people suffering from gout, as a cure, probably with very doubtful results. Yet such crude attempts to use the yet unknown forces of electricity were the beginnings of the vast electro-medical science of today.

Electricity owes its name to amber, the earliest substance known to show the pro-

perty of attraction; and the Greek word elektron, which means amber, has clung to the force that rules the world, although it was not given the name Electricity until so christened by Dr. Gilbert, the famous physician of Queen Elizabeth.

Very little more was heard of electricity throughout the whole of the Middle Ages. A few facts were handed down to history, but were of little importance. Eustathius told of a philosopher who, while dressing and undressing, would at times emit crackling sparks, flames blazing from him without burning his clothes, but it was nothing more than the electricity we get from stroking a cat on a frosty day. The old philosophers saw lightning without thinking of electricity; they looked upon it as a little flame falling from heaven.

Homer, in his famous Odyssey, described the sulphurous smell that follows lightning, due to the electrified oxygen's conversion into ozone—a process that we copy today for purifying the air of tube railways and large buildings. But everyone groped in the dark through the centuries for the real power that was to revolutionise the world, until the real beginning of electricity was made by Dr. Gilbert of Colchester, toward the end of the sixteenth century.

THE FIRST MAN WHO FOUND THAT ELECTRICITY CAN BE STORED

This distinguished physician first of all repeated the experiments that history had recorded with amber, and then set himself to see what other substances would become electrified when rubbed. Suspending a fine needle by a piece of silk, he held the rubbed object near it, and observed whether it attracted the needle. In this simple way he discovered that a whole number of substances could be electrified by friction, and he drew up a list of what he called "*electrics*," or substances with which electricity can be produced.

Robert Boyle, who lived from 1627 to 1691, now set himself to discover the origin of electricity. We may look upon him as being the first man to discover that electricity can be stored. For he found that a piece of amber, when it had been rubbed, did not immediately lose its powers, but that the charge of electricity remained upon its surface for some time. The importance of this simple observation has become immense today, for no force is of use to man unless it can be stored and used in the form required.

These little experiments had shown that the new force could exert power—the power of lifting. A contemporary of Robert Boyle next showed that the mysterious force could produce light. This was Otto von Guericke, who cast a ball of sulphur in a glass bowl, broke the glass, and, extracting the sulphur ball, mounted it on a spindle. When it was rapidly revolved, and the hand held against it, the rubbing (or friction) caused it to glow in the dark. The first electric lamp had been made.

THE TWO KINDS OF ELECTRICITY THAT ARE THE SOURCE OF ALL MATTER

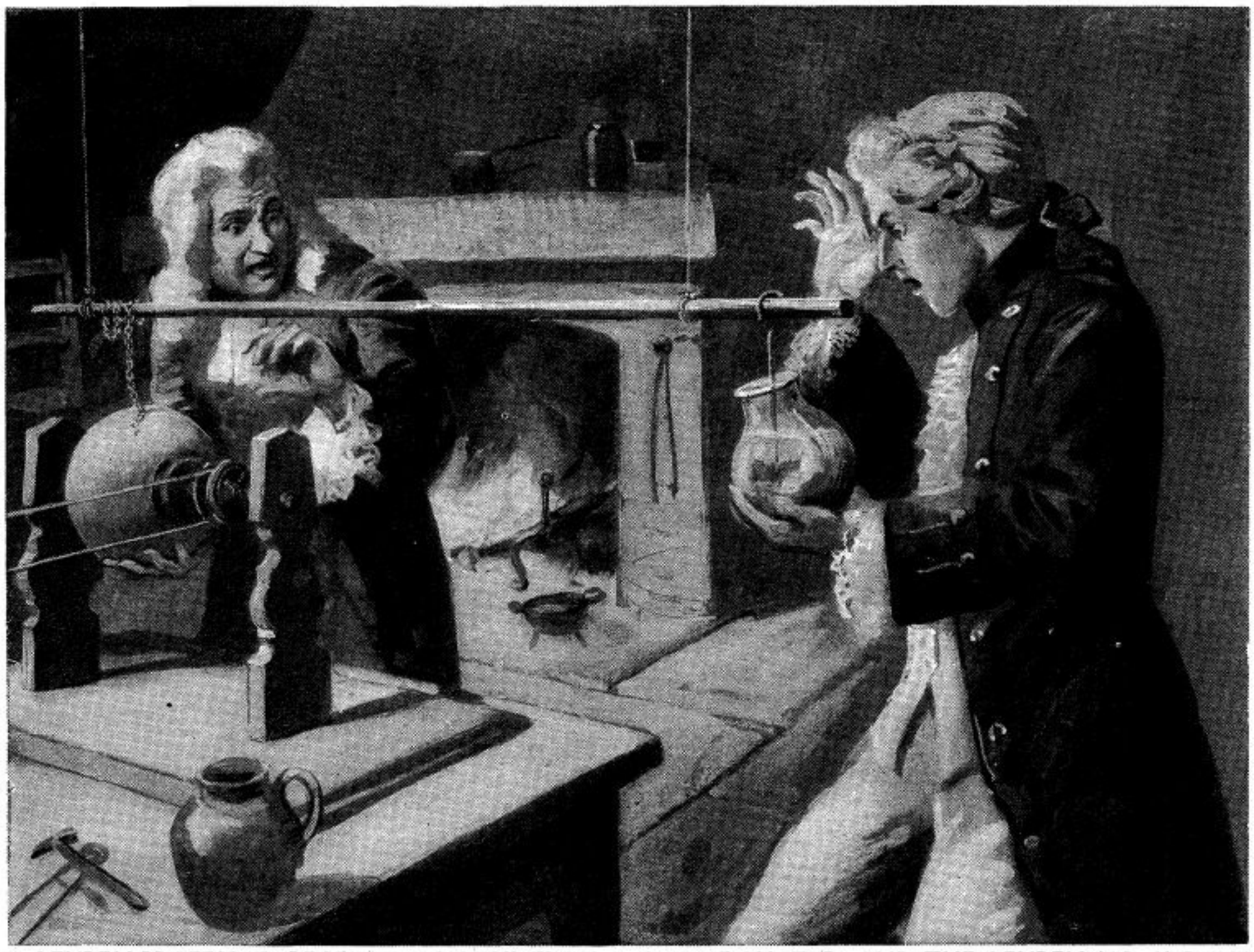
Another discovery was made by von Guericke about the same time—one of the greatest importance, for it led to the further discovery that two kinds of electricity exist—the two kinds, positive and negative, which we now know to be the source of all matter. He discovered that if a substance is attracted by an electrified body, and touches it, it is at once repelled.

This attraction, so swiftly followed by an exactly opposite effect, is due to the fact that any electrified body tries to share its electricity with a non-electrified one. Having done so, each of the bodies now possesses a charge of the same kind of electricity, and they no longer agree, because *like repels like*. Any boy or girl can prove this at home by a simple experiment. If two balls of dry pith, the size of a large pea, are suspended by pieces of silk thread so that they hang quite near together, and if they are then touched with an electrified rod—a stick of ebonite, for instance, rubbed with a piece of silk—they will instantly fly apart. The rod has shared its electricity with the balls, which become then charged with a similar kind of electricity, and *similarly charged bodies will repel each other*.

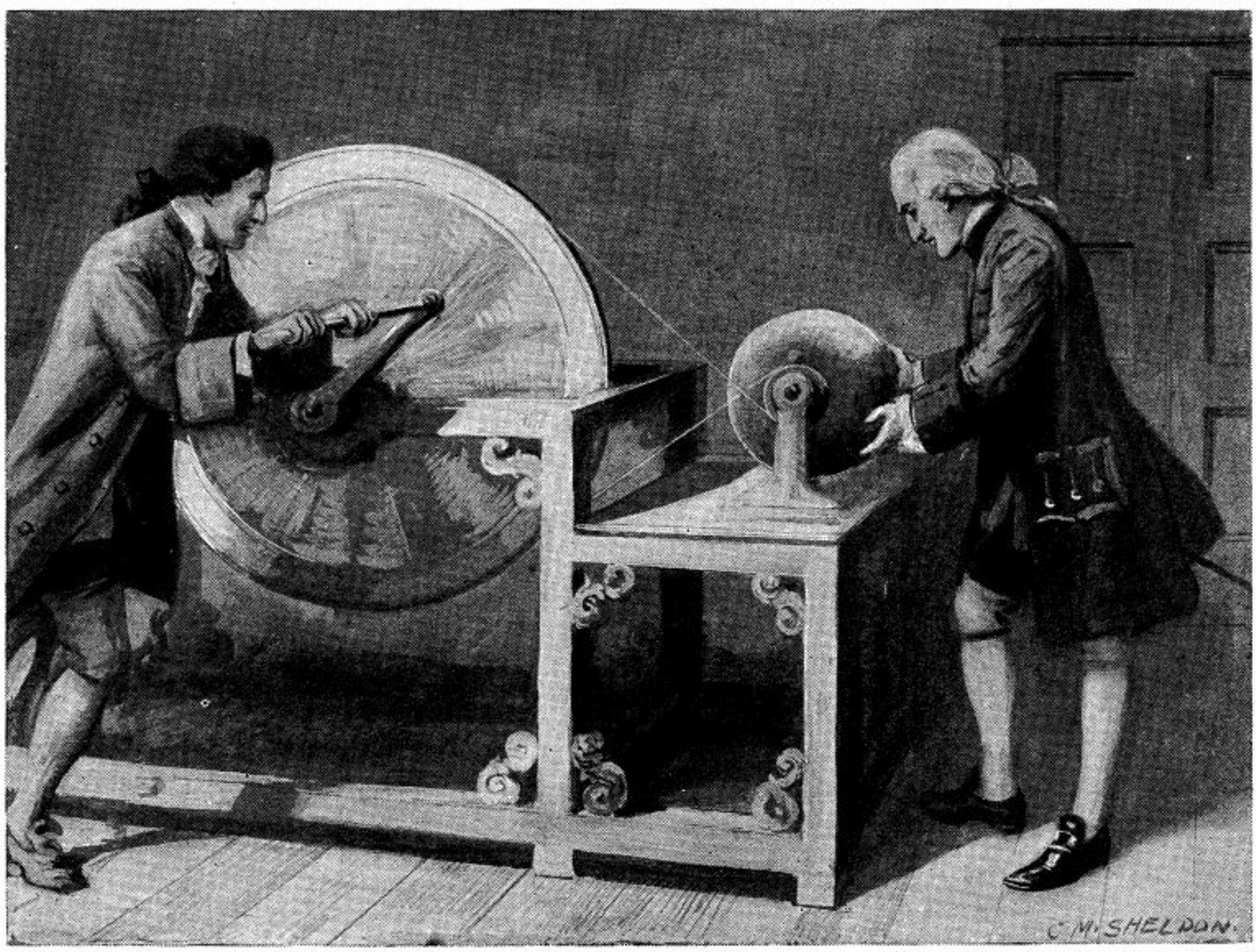
THE THREE WISE MEN WHO HELPED FORWARD OUR KNOWLEDGE

Three illustrious countrymen of our own next come into prominence: Newton, who made pieces of paper leap about in the air by an electrified glass; Hawksbee, who made many new discoveries about the attraction of electrified bodies; and Stephen Gray, who made the important discovery in 1729 that certain substances would *conduct* or carry electricity, while others would not. Without conductors and non-conductors we could do none of the things we do with electricity today. Look at the telegraph wires at the side of the railway track as you go along in the

THE ELECTRIC LAMP & THE LEYDEN JAR BEGIN



A LEYDEN PROFESSOR RECEIVES A SHOCK FROM A JAR OF WATER, AND THE LEYDEN JAR IS BORN



A WHIRLING BALL OF SULPHUR GLOWS WITH FRICTION, AND THE FIRST ELECTRIC LAMP IS BORN

train, and on each pole you will see little white porcelain insulators; porcelain is a non-conductor, and as it carries the copper telegraph wires it prevents the electric current from escaping.

These early philosophers carried the making of electricity to a really practical stage. We have already seen how von Guericke electrified a sulphur ball by revolving it with the hand rubbing against it to provide the friction. Newton and Hawksbee built primitive electric machines, the forerunners of quite powerful ones used later to produce X-rays and currents for electrifying crops.

THE ELECTRIC CURRENTS THAT WERE LOST ALL TOO QUICKLY

This turning round of a glass cylinder or disc and rubbing it by something to cause friction, was really the primitive electric machine. But the currents were so quickly lost that men now tried to devise some way of storing them. Various attempts in this direction led to the discovery of the Leyden jar, which for years played so important a part in wireless telegraphy. A professor of Leyden named Musschenbroek one day electrified some water in a glass bottle, and his assistant, who was holding the bottle, tried to disengage the wire that had been used to conduct the current to it from the machine. In touching it he received a strong electric shock, which showed that electricity had been stored up in the bottle, which had instantly communicated it to his body on being touched. The first Leyden jar had been charged and discharged.

It can be seen now to what a wonderful stage men's knowledge of electricity had been brought. The mysterious force that was to transform the world had been made by *work*, or friction; power had been turned into electricity.

THE MAN WHO WORE TWO PAIRS OF STOCKINGS, AND WHAT HE FOUND

This force could now be conveyed from one spot to another by means of conductors. Some substances would not conduct electricity, and by making use of such substances the new force could be kept apart; while by storing it in a Leyden jar, standing on some non-conducting substance, the power could be accumulated and then discharged when it was required.

To Symmer must be given the credit of having first discovered that there are two distinct kinds of electricity—positive and negative. Putting two stockings on the same leg, one black and presumably woollen, the other white and of silk, he found that when he drew them off, drawing the white one off from the black one, the friction charged each one with electricity, but of a different kind; each stocking stood up as if blown out, owing to its charge, and showed the shape of the leg.

If brought together the two stockings *collapsed*, because the two different kinds of electricity neutralised each other. But when he repeated the experiment with two stockings of the same material, the two pairs would repel each other when electrified and held together. We now know that whenever electricity of one kind is made by any method, an exact amount of electricity of the opposite kind is always produced, and that, while similarly charged bodies repel each other, *oppositely charged bodies attract one another*.

If we rub a glass rod with a piece of silk it will become charged with positive electricity, while a piece of sealing-wax rubbed with flannel will be charged with negative electricity. Both the glass rod and the stick of sealing-wax will pick up bits of paper or pith, yet the kind of electricity is quite different in each case.

THE GOLD LEAVES IN THE BOTTLE AND WHAT THEY TELL US

The presence of either kind may be shown by a little instrument called the electroscope. Two pieces of gold leaf are attached to a brass rod or wire which may be fitted through a cork in the neck of a wide-mouthed bottle. The gold leaves are suspended inside the bottle from the bottom of the wire, and a metal disc is attached to the top of the wire outside the bottle. If we touch the disc with an electrified object, the charge will at once be shared by the disc, and will be distributed to the gold leaves. Each leaf being thus electrified with the same kind of electricity, the two will repel each other, and will stand apart and form an inverted V, thus Λ. In this way the most extraordinarily minute charges of electricity can be measured. If, when the leaves are standing apart, we touch the disc with the finger, the leaves will at once fall together again; the electric charge will run through our body to the earth and be lost.

Many kinds of electric machines have been devised for producing large amounts of static electricity, which can be stored up and discharged in order to perform various experiments. Stroking a cat on a winter's

SIR ISAAC NEWTON HAS A LITTLE GAME

It delighted Sir Isaac Newton, who used to play with soap bubbles to learn about Light, to play with an electrified stick and little bits of paper, to learn about Electricity

day near the fire is perhaps the most primitive of natural "machines." The friction of the hand will electrify the hair of the cat, which will stand up, and a crackling noise will be heard as tiny sparks pass between the cat's fur and the hand. We can see the sparks if the room is dark.

The elaborate machines, in which the charge is accumulated in Leyden jars, are made by revolving cylinders or circular plates against substances which produce the necessary friction. A Wimshurst machine, which can be made of sufficient power to produce electric sparks several feet long, has two (or several) pairs of varnished glass plates revolving in opposite directions, on the outsides of which are cemented a number of sectors made of tinfoil. Brushes of tinsel, fixed on arms, excite the tinfoil sectors as the plates revolve. Metal combs placed at each side of the wheels collect the electricity.

The earth itself may be looked upon as a huge store-house of static electricity, and, indeed, as a giant generator of current. The globe itself, and the layer of atmosphere round it, may be looked upon as the two plates of an enormous spherical condenser, the earth itself being the negatively charged plate, the atmosphere the positively charged one.

THE ELECTRICAL ILLUMINATION OF THE SKY 200 MILES ABOVE THE EARTH

When a liquid evaporates, electricity is formed, the evaporated vapour carrying up with it a positive charge. One authority tells us how the evaporation that is continually going on all over the world bears a constant stream of positive electricity to the upper atmosphere, and how discharges occur between layers of air and cloud, giving rise under certain conditions to the wonder-glow in the northern sky which we know as the aurora borealis.

These electrical effects are always greatest at the Poles, and it is in the polar regions that the aurora is most brilliant, the luminous discharges taking place sometimes at heights of more than two hundred miles above the Earth. Such remarkable development occurs in the vegetation in these regions, such remarkable yields from the crops, that Lemström and others were led, towards the close of the last century, to look into the matter, and it was found that the needle-formed leaves of the northern pine, the beards on the ears of cereals, and so on, were very much more pronounced than on those of warmer climates. Plants, in fact, continually collect the static electricity from the atmosphere with their myriads of hairs, spikes, and sharp points—to which a static charge will always fly—and by transmitting the electricity to the earth they assist in the actual production of their own nitrogenous food.

These discoveries led later to experiments in which positive electricity, generated by a machine, was distributed by means of wires supported by poles to their crops growing below, and in this way wheat and barley have been made to yield more than half as much again of their golden harvest as they do without electric help.

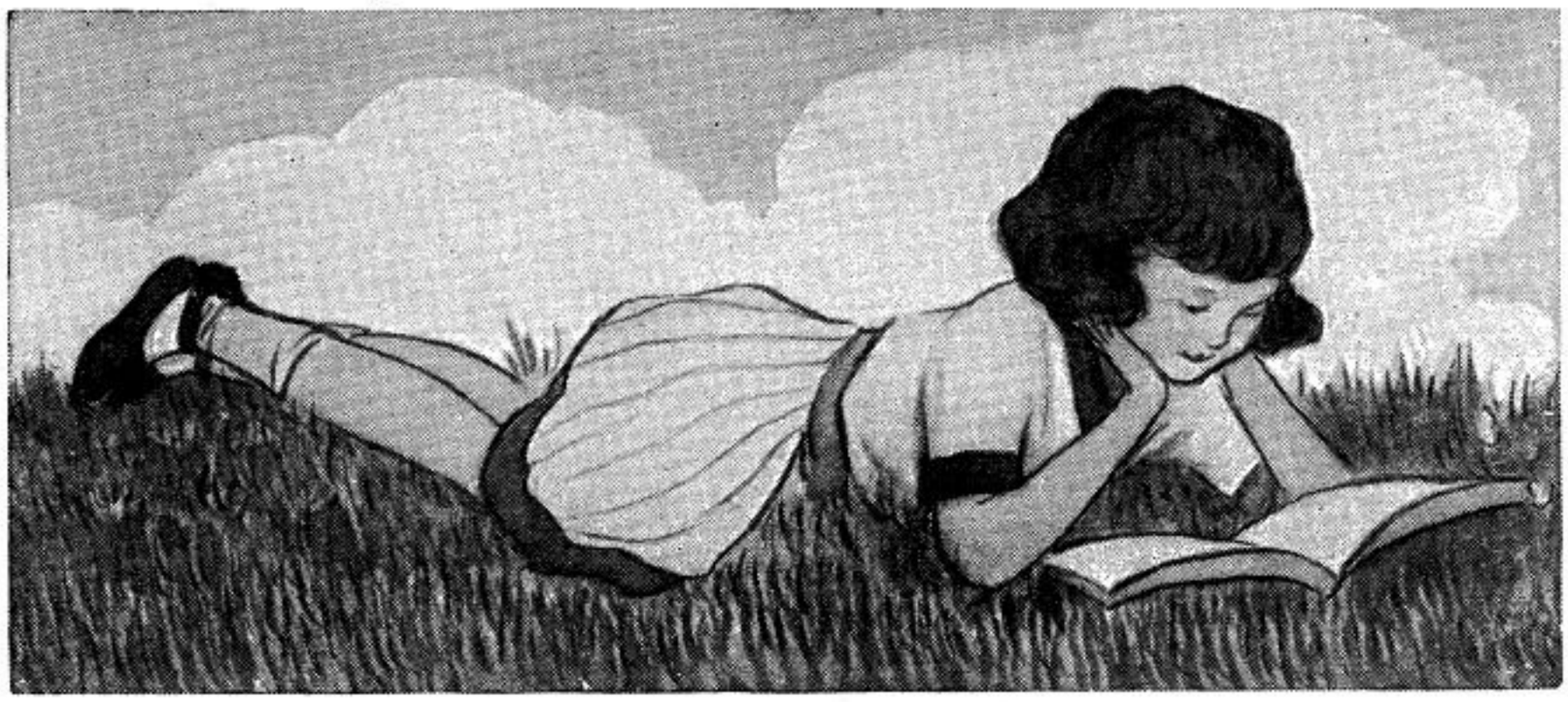
THE LIGHTNING FLASH AND ITS FIFTY MILLION HORSE-POWER

In wonderful contrast to the feeble currents of electricity caused by friction, are the intensely powerful discharges that occur during a thunderstorm. The angry clouds of the storm were the first electric dynamo, and they remain today vastly more powerful than any electric machine made by man. Fifty million horse-power is released from the huge storage ground of the clouds, and discharged in the hundred-thousandth part of a second in the form of the blinding flash of lightning.

A Swedish scientist named Norinder has discovered that two things happen in the sky during a thunderstorm. There is what he calls a "first variation" in the conditions, which is connected with the movements of the clouds and with silent discharges of electricity—the movement of electric charges *without* a spark; this condition lasts for about ten seconds. Then there come a series of very rapid changes in the electric field, which result in the pent-up electricity bursting the bonds which hold it—the resistance of the air between the clouds and the earth—so that it is discharged to the earth.

HOW THE LIGHTNING CONDUCTOR GUARDS A HOUSE FROM DANGER

The charge in a Leyden jar will fly to a finger held near it. In this we see what the lightning conductor does. It is a pointed metal rod placed on the highest part of a building, and to it leaks the electricity stored up in the thunder clouds. The result is that in the immediate surroundings enough electricity to break through to earth is never able to accumulate, and the safety of the building is thus secured. The conductor is connected to a metal plate buried in the earth, to which it conveys the electricity it collects.



POETRY MORE PRECIOUS THAN GOLD

It is a splendid thing to say something the world will never forget. That splendid thing has been done often by great men and women who have written fine thoughts in words so beautiful that the books in which they are found will never die.

Most of these thoughts that cannot be forgotten are in poems, for poetry is far more easy to remember than the ordinary reading called prose. There are thousands of poems that everybody ought to read because they preserve the world's choicest thought in the choicest words, and those who do not read these poems can never know how fine a thing reading is.

True poetry is more precious than gold. Not only does it make us good and happy and hopeful, but it is so pleasant that the words sound like music.

When we write a story, or tell about a place, or a thing, or an event, in words like those we use in speaking to each other, but choosing them carefully to express our meaning, and also to have a fine and pleasing sound, we use Prose. But when grander events and more beautiful scenes are described, or nobler thoughts stir our spirits deeply, demanding words more thrilling or sweeter and more musical in sound, we use Poetry. Poetry is expression made perfect, the best thought in the best words.

At first poetry was great joy or great sorrow put into song. Long ages ago, when our far-off forefathers could not even read or write, they had poets who went with them into battle to compose fine-sounding verses to celebrate the victory, or laments for defeat. These verses were sung while they played a harp, so poetry then was feeling expressed in musical words suitable for singing.

We think of poetry now as it is read in books, but at first, before books came, it was only known by being heard, either sung or recited; and making it in simple forms was quite common. The earliest English poet we hear of, Caedmon, tells us how ashamed he was when, as he sat with a circle of companions and the harp was passed to him, he could not make and sing his verse in turn. It was in this way that the short stories in verse, which we call ballads, were first composed, not by one poet but by many, and then passed on by memory.

Poetry is grouped into three kinds—Epic, Dramatic, and Lyric. Epic poetry is an extended description in grand and noble words of some great event, or of the career of a hero, or of a period in the history of a nation. Dramatic poetry is written in the form of people speaking to each other, and is acted on the stage. Lyric

poetry was originally intended to be sung to the playing of the lyre, an ancient form of the harp. All beautiful songs come into lyric poetry.

Sometimes poetry is written in rhymed lines, the words at the ends of the lines having similar sounds, as in

The world is so full of a number of things,
I'm sure we should all be as happy as kings.

The lines in which the rhyming words occur need not be next to each other. They may be alternate, as in

Arabia's desert ranger
To Him shall bow the knee,
The Ethiopian stranger
His glory come to see.

Or the rhymes may be otherwise separated, as in the lines

Ring out, wild bells, to the wild sky,
The flying cloud, the frosty light;
The year is dying in the night
Ring out, wild bells, and let him die.

Some lines, too, may have rhymes and others be unrhymed, as in

Blue were her eyes as the fairy flax,
And her cheeks like the dawn of day,
And her bosom white as the hawthorn buds
That ope in the month of May.

THE POETRY THAT TELLS OF GREAT EVENTS AND HIGH IMAGININGS

Here day and May rhyme, but flax and buds do not. The advantage of rhyme is that it pleases the ear, and helps us to remember the words, the sound speeding us on to the next similar sound. But rhyming does not make poetry. It is the beauty of the thought and the balance and melody of the words that make true poetry.

And, indeed, much of the finest poetry has no rhymes, but is balanced in lines with such dignity and sweetness that it is grander than rhymed verse. This form of poetry, called blank verse, is used to tell us of great events, tragedies, high imaginings, and noble deeds. Shakespeare and Milton wrote most of their works in this way. Here is an example from Shakespeare, describing Brutus:

His life was gentle; and the elements
So mixed in him that Nature might stand up
And say to all the world, This was a man!

How fine these lines sound! They have the solemn music of a grand organ, and need no rhyme; but each line balances with the other in syllables and accent.

Lyrical poetry is divided into verses. Strictly speaking, a single line of poetry is a verse; but usually any two lines, if they come together and rhyme together, are called a couplet, and three or more lines may combine into a verse. Another name for a verse is a stanza. Four rhymed lines are called a quatrain.

THE LONG, LONG HISTORY OF OUR SWEET ENGLISH TONGUE

The Sonnet is a form of poetry that has been used with beautiful effect by nearly all the greater poets. It develops and illustrates one main thought in fourteen lines. An Elegy is a mournful poem about the dead. An Ode is a song of praise, and was originally written to be sung or set to music. Psalms and hymns are the poetry of worship.

English poetry has a very long history. It began when the English language was so different from the language we speak now that few of us would understand it. But for five hundred years our language has had nearly its present form, and though in modern times it has been written in more varied forms than before, its poetry has not been written more sweetly or nobly than it was written three hundred years ago. An anthology of the best poetry is given in another part of this book where we have the work of all those poets whose songs come echoing to us down the corridors of Time.

POETRY THE MUSIC OF THOUGHT AND FANCY AND NOBLE FEELING

It is our great hope that we may lead our readers into a love of poetry, which should be as natural for us to love as it is to love music; for poetry is the music of thought and fancy and noble feeling. The liking for it should be as quick as the liking for sweet sounds and scents, the colour of sunsets, or the thrill of splendid deeds.

Better than all other means it expresses these delights. It can record them for us and bring them back to us as fresh as ever, and with the added magic of haunting words with a beauty of their own. Life has no greater enrichment than the love of poetry. It never loses its charm. That, in ever-varying beauty, is the offering we make in these pages to all who read them.

In reading poetry we should always understand that it is of many different kinds, appealing to widely different minds, and sometimes suiting one mood of our own mind and sometimes another. Great

mistakes have been made, even by critics who have had a love of poetry, in refusing the name of poetry to verses that do not happen to suit their own taste at the moment. We should beware how we try to fix the bounds of poetry too narrowly.

Clever people will sometimes try to rule out simple songs for children, and will say they are not poetry. And those who enjoy simple verse will not trouble to understand what others can enjoy in blank verse and the majestic measures of the greater poets. Both are often looking at poetry too narrowly, for it covers a very wide field, varies greatly from age to age in its form and spirit, and, when it rings true, moves the hearts of nearly all mankind by some of its strains.

It is like the wind in its changeful moods, now whispering softly to the leaves, now fanning laziness with a lulling breeze, now blustering along masterfully, now piping shrilly round the cosy home, and again smiting the ill-clad deeply with cruel blows, or raging in wild commotion with its companion the trackless sea. None of these moods, gentle, commonplace, or terrible, can claim for itself the full and exclusive name of the wind. It is all of them.

A FIGURE DRAWN BY RAPHAEL TO REPRESENT POETRY

And so it is with poetry. The simplest song of childhood may lisp it, sweet and low. The daily life of the home is electric with it. It wings the messages of religion on their way to the human heart. If there are people who show a contempt for the poetry of childhood, or for the verses that express the sentiments of family life, or deny the right of hymns to a generous share in true literature, they are, by such narrow views, proving that they have yet something to learn about true poetry.

It is true that poetry was first of all at home amid scenes where men's hearts were stirred by strong passions. War has always, in its dreadful agony, aroused men to poetic fervour; as have bold adventures, staunch heroism, and noble sacrifice.

The tumult of men's passions and the mysteries of their fate have inspired poems, powerful and profound. So, too, have all the wonderful charms of Nature, changing day by day, and present everywhere; but these fine materials for poetic treatment must not blind us to the simpler forms of poetry that satisfy plain people.

One of the objects of the poems that will follow through this book is to broaden the appreciation of British poetry, and avoid slavery to any fashion. For the history of verse is a history of the rise, the reign, and the decay of a series of fashions in writing, thinking and feeling. Elizabethan song, the well-drilled writing of Pope's day, and the overflowing sentiment of the first half of the nineteenth century were fashions that left the world weary of their sameness. Each of these movements was popular, and then left the reader tired and seeking a change. First praised to the skies, each became rejected and neglected. Knowing that this injustice is always happening, the wise reader will enjoy what is permanently good, whether it be simple or great, and will be unmoved by all exaggerations, praise, or blame.

The coinages of song are of varying value, but each, if it is to be preserved, must have some measure of the pure gold of poetry. It may have the small value of trifling fancy, or the plain worth of faithful description, or the higher stamp of glowing and noble feeling, or the inspiration of lofty thought, and each will appeal to some minds; but happiest are they who can give a due welcome to all.

JUSTICE IS CALM, JUSTICE IS FAIR

THE FINE PICTURE OF JUSTICE BY THE FRENCH ARTIST DAGNAN BOUVERET

The Great Words that Stir the Hearts and Minds of All Mankind

JUSTICE

IN ancient times the king would come down from his palace to the gates of the royal city, or the gates of its chief temple, and there administer justice to his subjects. Many of the gates of great churches were sculptured with lions to suggest the strength and dignity of the law. Thus came the phrase *At the gates*, or *At the lions*; and so to this day men speak of *The gate of justice.*

But before ever temple was built, or king reigned, the idea of justice lived like a lion in the minds of savage men. They were brutal, fierce, ignorant, and cruel; they had "their living to get," and to get it they had to fight cunningly and unscrupulously against all the forces of Nature. Nevertheless, they were conscious in their minds of certain laws, of a right way and a wrong way of doing things, and of a Power, higher than anything they could see with their eyes, which was somnolent when they did right, but seemed to them like a roaring lion whenever they did wrong.

These men regarded justice with great fear. They were superstitious. If they did right, they would prosper; if they did wrong, they would be smitten hip and thigh. They did right chiefly because they feared the consequences of wrong. But when they had partly outgrown this fear, when they discovered from long experience that wrong might sometimes be done without visible suffering on their part, still they kept in their minds the idea that there is a vast difference between right and wrong, and nursed the faith that above all the laws of man is an abiding and unchanging justice.

Plato taught the sublime doctrine that, though a man might have to suffer evil for the sake of justice, he would suffer a yet greater evil, even if he prospered, by doing injustice.

This faith has now become the very centre of man's social life. It is the very soul of civilisation. "Justice, sir," said Daniel Webster, "is the great interest of man on Earth."

What do we mean by Justice? We do not mean the law. Law is a thing that changes; it has as many coats as a dandy, and as many reflections as the glass of Fashion. In Cromwell's day, and later, a man might be hanged for stealing a shilling. There is a bridge in Dorsetshire, crossed in these days by charabancs and motor-lorries, which bears the warning that anyone who damages the structure will be transported for life. Once there was a thing called Jedburgh Justice, which meant "hang first and try afterwards." It is not a hundred years ago

since children were suffocated to death in London's smoky chimneys, and fell fainting and dying on the steaming floors of cotton-mills.

The law allowed these things. No chimney-sweep could be prosecuted for sending a little, shrinking girl up a crooked chimney ; no cotton-spinner could be tried for murder when a delicate workhouse child dropped dead at the foot of a loom. Today such frightful things are impossible. Why ? Because the law has been altered. But why has the law been altered ? The answer lights up for us the whole dark night of man's heroic past. The plain answer is simply this—*Because Justice demanded that the laws should be altered.*

HOW HAS THE GREAT IDEA OF JUSTICE COME ABOUT ?

Now, we know very well that no statue of Justice opened its lips and told men that these laws should be altered, and that no handwriting to this effect appeared on the walls of Parliament, and that no voice spoke from the sky bidding men to change their wicked laws. How, then, did Justice make known its demand ?

The idea of justice is the creation of man's mind. It does not exist in Nature. There is no justice between wolf and lamb, fox and fowl, hawk and sparrow. Great men like Pericles, and many smaller men, have even denied that justice can exist between strong nations and weak nations. " The strong do what they can, and the weak suffer what they must," we are told. Yet the idea lives. It is here in the world. It has never been burned out of man's mind by fire or cut out of his soul by the sword. It has triumphed over all tyrants ; it has outlived all despotisms. It is pronounced and still is the great interest of man on Earth. How has this come to pass ?

THE SOUL OF MAN ACHIEVES SOMETHING NOT FOUND IN NATURE

It is because Justice, arising in man's mind, has ever been making its demands known by the voice of conscience. We often hear the words " It may be law, but it is not just." Men do away with a bad law and make a better law, and Justice whispers, not " Well done," but " Better still."

It can never be satisfied with any of our enactments. It is the mind of man himself, raising itself up to see the next turn in the road, the next height to be scaled. It is a sign to us that we are travellers to a noble goal and heirs of a glorious destiny. For this idea of justice is man himself, the soul of man acting on a brute body and achieving something not to be found in all the realms of Nature.

Justice is not represented even by the splendid figure of the judge. The judge in his scarlet and ermine represents the majesty of the law. He is there to see that the cunning of contending advocates does not mislead the minds of the jury, and to see that the prisoner, guilty or not guilty, is given a fair trial according to law. But men feel and know that there is a justice higher than the justice of the law, even the most just law.

" Look with thine ears," says our clear-sighted Shakespeare ; " see how yond justice rails upon yond simple thief. Hark, in thine ear ; change places ; and, handy-dandy, which is the justice, which is the thief ? "

The preacher John Bradford, seeing a condemned man pass to the gallows, exclaimed, " There, but for the grace of God, goes John Bradford ! " The symbol of Justice is a pair of scales. What son of man can hold them even ?

ONE OF THE VERY NOBLEST THINGS IN HUMAN HISTORY

Earth's justice can never be perfect. Above any form of justice conceivable by the mind of man hangs the eternal and absolute justice of that great God " from whom no secrets are hid." Early in the history of the human race came that marvellous cry, " Enter not into judgment with Thy servant, O Lord ; for in Thy sight shall no man living be justified." This thought it was which led the most inspired of all our poets always to associate mercy with justice.

But, imperfect as man's justice is, it still stands for one of the very noblest achievements of human history. It might almost be said, indeed, that the strongest movement in the tide of moral progress has come from man's longing after justice. Of justice he has dreamed in the midst of oppression, and for justice he has fought even in the chains of slavery. No voice rings so persistently and powerfully through all the despotisms and tyrannies of times past as the voice of the bondman claiming justice as a right. No hands were lifted more heroically in the history of mankind than those manacled hands of the oppressed slave striking for the liberty of justice.

Kings have destroyed prophet after prophet who uttered this divine word, and king after king has been destroyed by the people who listened to those prophets. The grandest of all struggles in the chronicles of humanity are those in. which the conscience of simple men contended for justice against the cruel sword of resentful and implacable authority. Despot after despot exclaimed, "I am the Law, I am Justice, I am Authority"; but each time the people answered, "Nay, for you, too, are a man; above you, O King, is the Justice we will abide by, the Law we will honour, the Authority we will reverence, even the God of our conscience." Has not man prayed for two thousand years, "Thy will be done on Earth, as it is in Heaven"?

In these great struggles the thought which impelled the people was noble and splendid, but their idea of justice was crude. They claimed the right to tax themselves, to manage their own lives, to make their own laws, to live in freedom of mind and body. All these things we now take for granted. We cannot imagine ourselves in a state of slavery—told what we must do, ordered to think only as the King ordains, our privacy and our property for ever at his mercy. All that those heroes fought for and died for we possess. Their ideal is now our normal.

THE FARTHEST JOURNEY OF ALL THAT JUSTICE HAS TAKEN

Has justice, then, reached the end of its journey? By no means. Indeed, the farthest-reaching of all its journeys is only now begun.

The law tells us that we may enjoy the fruits of our labour. If a burglar enters our house he is guilty of breaking the law, for he is taking from us what we have the right to keep for our own enjoyment. But how speaks the voice of conscience when a starving man looks in at our window or a famished child stands at our door? Is it just that we should eat and drink as if there was no starving man near by? Nay; is it *possible* for us to do so without a feeling of guilt?

And yet why should there rest upon our conscience this feeling of guilt? We are breaking no law at our feast. The food is ours. We have worked for it, paid for it, and it is necessary to our health; whereas the starving man may be a rogue, and the hungry child may be the daughter of a wicked mother who will be all the wickeder if we relieve her of the moral duty to feed her child. All the same, that feeling of guilt remains. No logic can still the voice of conscience. We hear no whine from those hungry and homeless creatures outside in the wind and rain, but conscience says to us, "Justice, justice!"

WHAT IS IT THAT MAKES LIFE SO GREAT AN ADVENTURE?

Thus does virtue grow with a man; thus does the human race never attain any of its ideals. All we can do is to reach stages in those ideals, never their ends, which are lost in eternity. This it is which makes human life so splendid and so unendingly a great adventure. For to conquer a wrong and to possess ourselves of a right is not to find a throne and sceptre awaiting us, but a long road and a pilgrim's staff.

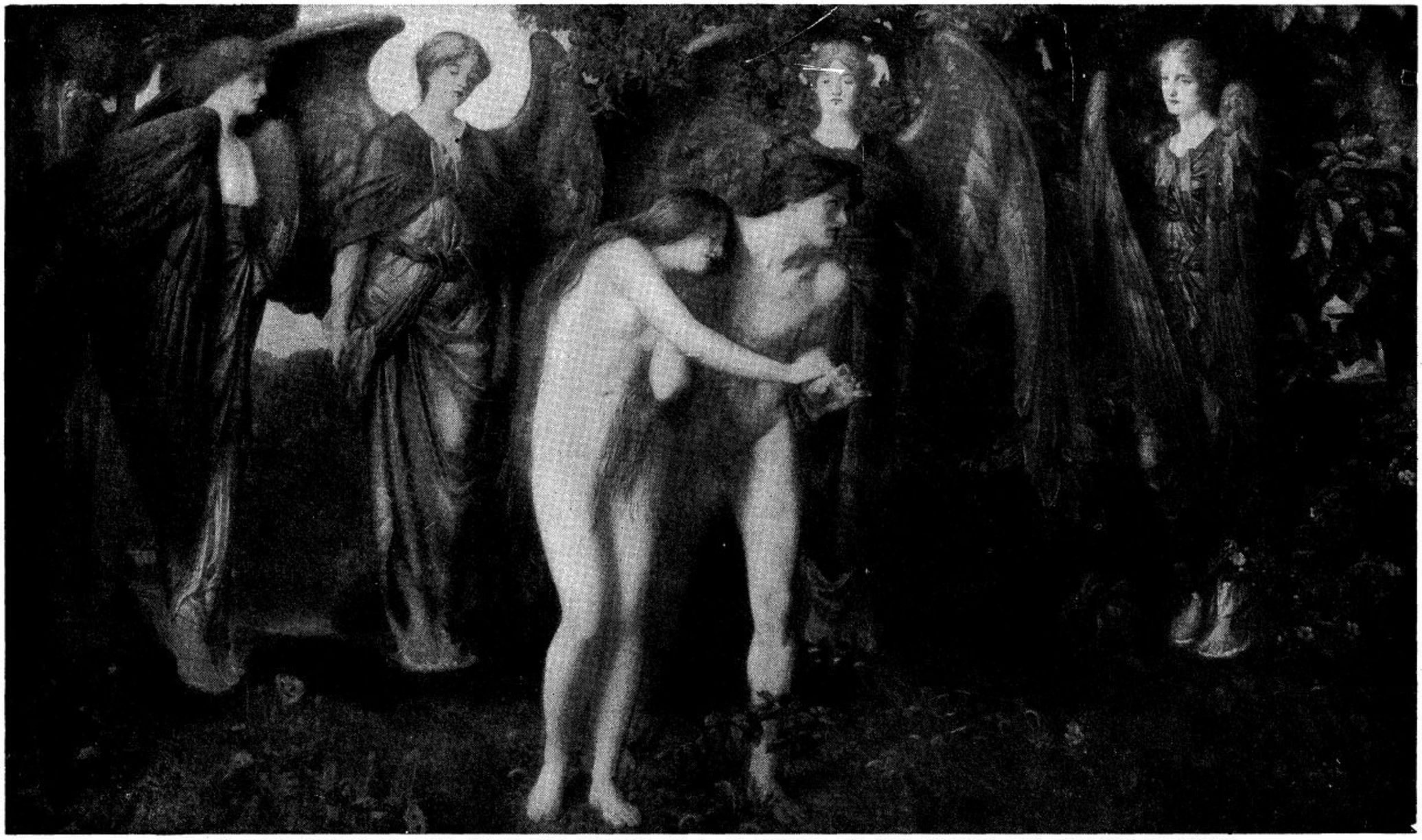
A right is not an easy chair and a footstool, but a hard duty. It is just that man should be free, but it is not just that he should use freedom to prey upon others or to gratify his own selfish interests. It is right that men and women should have votes to decide who shall make their laws for them, but it is not right that they should use that power carelessly or only to promote their own welfare. Justice says, "All power is responsibility. You are strong to make others strong, free to make others free, wise to make others wise." The law says we have a right to possess learning and riches. Justice says we have a duty to share those privileges with others. Every virtue is a door to service, and every great attainment of man is the first page in a book which never ends.

WE CAN BE UNJUST IN OUR THOUGHTS AS IN OUR ACTS

True justice is yet to come. We shall have moved a little on that shining path when we recognise that we can be unjust in our thoughts as well as in our acts, and that to be just to our friends, just to those who are kind to us and whose prosperity is akin to ours, is not enough.

Perfect justice will bring not only peace to a warring world, but brotherly help between nations. It will purge the heart of man of all hatreds, calumnies, jealousies, and scorns, and ignoble egoisms. It will draw men together. It will make this Earth like Paradise, and even then a man will know in his heart that pure justice is still ahead of him in the heart of God

THE SAD DAY WHEN ADAM AND EVE WERE TURNED AWAY FROM THE GARDEN OF EDEN



THE EXPULSION FROM EDEN. FROM THE PICTURE BY A. T. NOWELL IN THE WALKER ART GALLERY, LIVERPOOL

The Story of the Most Beautiful Book in All the World

The Creation of the Sun and the Moon—Raphael's picture in the Vatican, Rome

THE BIBLE STORY OF CREATION

THE Bible, in the beautiful Story of Creation told in the Long Ago, tells us that in the beginning there was a great darkness, and that there was nothing which had any shape or form. Try to think of this black darkness and this dreadful emptiness; everywhere, darkness and nothingness. There were no stars, no lovely Sun, no wind blowing through trees, no waves breaking into foam at the foot of the cliffs. There was no Earth, no heaven, no light, no heat and cold—only darkness, silence, and emptiness everywhere.

But God was there, and the Bible tells us that the Spirit of God moved upon the face of the waters which filled the whole of the shapeless universe, like the ether, the mysterious stuff that is in all space. Out of this strange element God created the heavens and the Earth.

The first words breathed by God, the Bible tells us, were those wonderful words:

Let there be light.

The first thing God wished to do was to send away the great blackness. So God spoke, and in speaking He did two things. He broke the awful silence that reigned throughout the world, and created Light.

Then the Bible tells us that God called the light Day, and the darkness which visits the Earth when the Earth turns her face away from the Sun, He called Night. This was the beginning of the acts of creation. Then the Bible tells that God divided the waters which filled the great universe, setting heaven in the midst of it. Then the water which was under heaven He gathered into one place and called them the Seas of the Earth, and the dry land appeared out of the midst of the seas, and God called the dry land Earth.

Then came the grass springing out of the dry land, and many strange and lovely herbs, and trees throwing their shadows on the grass. God made the herb and the fruit tree, each with its own seed, so that they could sow themselves and gradually cover the Earth with beauty and joy.

Then God filled the sky with stars, and gave the Sun power to rule the day and the Moon power to rule the night.

And now, this story of creation tells us, came a greater wonder still. Out of the deep waters upon the Earth God called forth Life. He spoke, and from the water issued living things that could move and utter sound, and swim and fly—tiny and unseen things, millions of them; huge and mighty things, thousands of them; so that the whole Earth, the water, the land, and the air became filled with life.

Finally God said: "Let us make man in our image, after our likeness; and let him have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the Earth, and over every creeping thing that creepeth upon the Earth."

Then came forth Man and Woman, whom God created in His own likeness, and into whom He breathed the breath of life. And God set this man, whom we call Adam, and this woman, whom we call Eve, in dominion over all the Earth, to rule it, to conquer it, and to enjoy it.

THE BEAUTIFUL PICTURE OF THE MAKING OF THE EARTH

How beautiful is this picture of God making the wonderful Earth for Adam and Eve and their children to enjoy in happiness and peace! The animals came to them when they were called; the birds sang over their heads as they walked; and the fishes came to the side of the lake to watch them as they stood in the sunlight. Do we not feel that we should like to live in such a happy world for ever and ever?

But this happy Paradise did not last. The Bible story fills our eyes with tears that man should have been so foolish and so ungrateful to God.

God had given man everything on the Earth except one thing. There was one thing which man was not to do. If man did this one thing he would lose all his happiness and all his peace. *And man did do this very thing.*

The Bible tells us that this one thing man was not to do was to eat of the fruit growing on a certain tree in the Garden of Eden. There were a thousand other fruits of which man might eat, but this one was forbidden. If man loved God he would not eat of this tree; if he did not love God he would disobey. So, you see, this was God's test of man's love.

THE STORY OF ADAM AND EVE IN THE GARDEN OF EDEN

Well, we read how Satan, the Evil One, took the form of a serpent and glided into the Garden of Eden, sought out Eve while she was away from her husband's side, and suggested to her that she should eat of the fruit. And, although Eve did not at once obey the Evil One, she argued with him, instead of driving him from her. So the temptation to eat the fruit stayed in her mind; she allowed herself to think about it; and at last the temptation was too great for her. She ate the fruit, took it to Adam, her husband, and persuaded him also to do this forbidden thing.

Then, the Bible tells us, Adam and Eve heard the voice of the Lord God "walking in the garden in the cool of the day," and they were afraid and hid themselves in the trees. And God said because they had done evil they must suffer. But the punishment God sent them was not a cruel punishment. He made them go out into the world to toil for their existence.

Now, though work is hard, it is far better than idleness; and in setting man to till the Earth God has provided him with the opportunity of making himself better and kinder and purer. So that when we see pictures of Adam and Eve going out with tears and shame from their beautiful garden of Innocence, we must remember that over them the face of God is smiling with love and pity, knowing that His children shall one day return to their Garden and to Him.

THE SEVEN DAYS

The first day God created light:
He made the day and made the night.

The second day of His intent
He made the heavenly firmament.

The third day came both land and sea,
And grass, and herbs, and bush, and tree.

The fourth day Sun and Moon had birth,
And stars that twinkle over Earth.

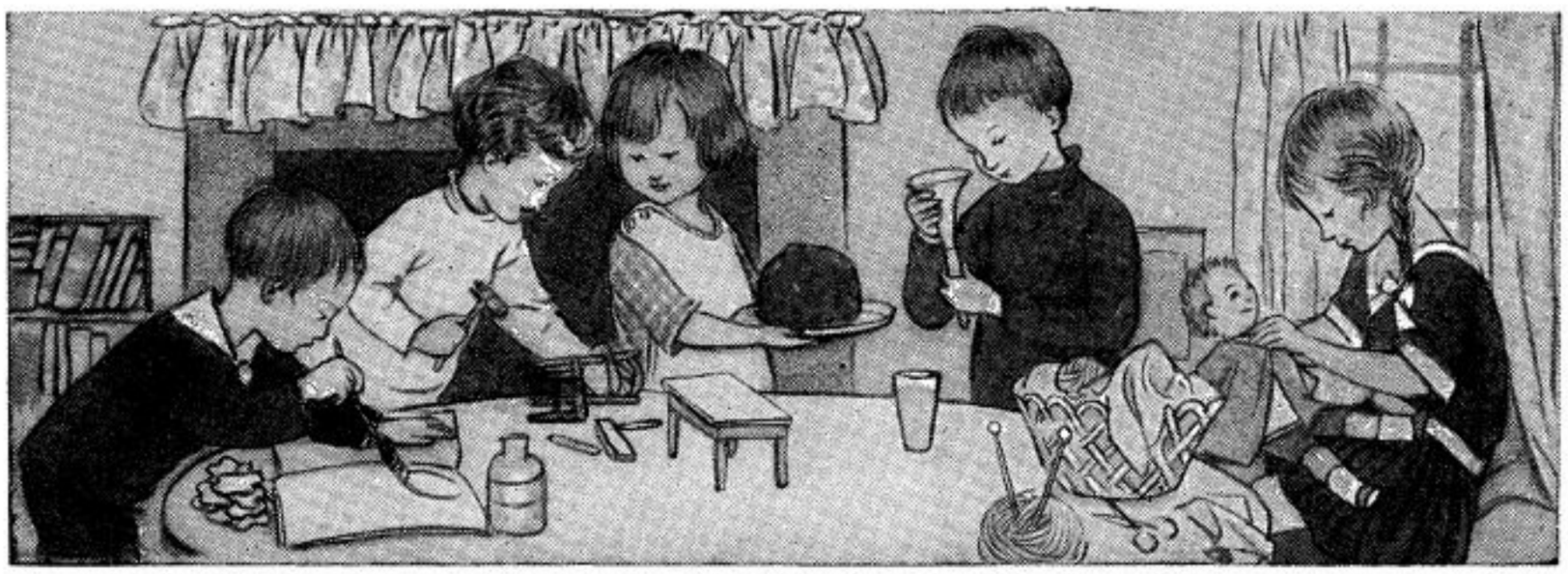
The fifth day, from the waves of strife,
God called great creatures into life.

And in the sixth day of His plan
In his own image God made man.

Then when His work the Lord had blest
The Seventh Day He gave to rest.

This account of the origin of all things is an inspired vision that was placed first in their sacred book by the Hebrews, before they began to tell the story of their race and its descent from Abraham. It was natural to ask who lived before Abraham, and so, when the Hebrew records and traditions were gathered into one book, not by Moses but about 800 years after his death, this fine vision of the creation, wonderful in its imagination, and its likeness to what modern knowledge has found out, was prefixed to the book. The various backward races of mankind have their legendary accounts of how the Earth came to be, but nothing has been imagined by the mind of man to compare with this Bible story in beauty, dignity, and truth.

The Interests and Pleasures of Life for All Indoors and Out

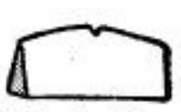


A FIDDLE FROM A CIGAR-BOX

THE easiest musical instrument to play is the one-stringed violin. If we have a good ear for music, if we can sing or whistle an air correctly after having heard it once or twice, we shall soon be able to play a one-stringed violin. We need not study music. We need not even be able to read the notes. We shall learn by experience where to put our finger on the string of the violin to get any note we want, and in a very short time we shall be able to play simple tunes.

Occasionally these instruments are to be seen in music shops, but it is so easy to make one that it is really hardly worth while to spend money. We shall make our violin out of a cigar-box—the size that holds fifty cigars.

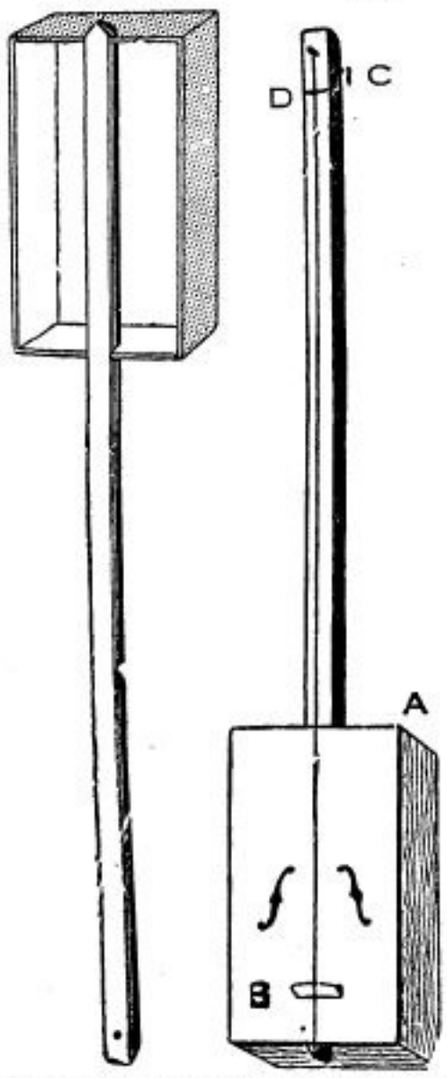
First we must take off all the paper that is stuck round the edges of the box. The easiest way to do this is to scrub it off with a hard nail-brush that has been dipped into boiling water. We must not make the wood wetter than we can help, or it will warp. The lid will now come right off, because it was only the paper that formed the hinge. On this lid we must draw with a pencil the two little figures, something like an S in shape, shown in the picture. We can cut these shapes out with a fret-saw in a few minutes, but let us do it as neatly as we can, for the appearance of our violin depends upon its being done well.



The bridge

The stop

The peg



The picture on the left shows the violin without box-lid and that on the right the complete violin. (A) Cigar-box; (B) bridge; (C) peg; (D) stop.

Now we must get a piece of hard wood about thirty inches long. Walnut or mahogany will do. It should be about three-quarters of an inch wide and half an inch thick. A carpenter will cut a piece to these measurements for a small sum. We should ask him to plane away the sharp edges on one side and leave the others square. Then, when we look at the end of the wood, we shall see that it is shaped like a D—round on one side and flat on the other. With a sharp penknife we must cut two notches in the ends of the cigar-box for this piece of wood to fit into. When we have made the notches almost big enough with the knife, we should wrap a piece of sandpaper round the wood that is to fit into them and rub it steadily backward and forward in the notches until they are quite smooth. In this way we can fit the wood into them in workmanlike fashion.

Now glue the wood into the notches, leaving about one inch projecting at one end. Then put a little glue all round the edges of the box and on the wood between the two sides, and fix the lid into its place again. A few tiny brass screws put in round the edge of the lid will make it all quite firm.

Now, about one inch from the end of the long piece of wood, make a hole about one-third of an inch in diameter, and fit into it a small wooden peg shaped like the one shown in the picture.

The violin is now practically complete. We need only two tiny pieces of some hard wood. One will form what is called the bridge, and the other will be merely a thin strip which is glued close to the peg and called the stop. We can cut them out of a boxwood ruler that can be bought for a few pence. The picture shows how they are to be fixed.

Now we must go to a music shop and ask for one A string for a violin. This will not cost much. A strings are generally made double the length required for ordinary violins, so they will be just right for ours. We had better tell the shop people that we want a double-length one, uncut, and they will understand. At the same time we can buy a violin bow. New ones can be bought for a few shillings, but often music shops have second-hand ones that are cheaper, and these are sometimes very much better than those that have never been used before.

Before we attempt to fix the string we must cut the little piece of wood that projects from the bottom of the violin to a point. Then we must make the box quite smooth with sandpaper and give it a coat of varnish.

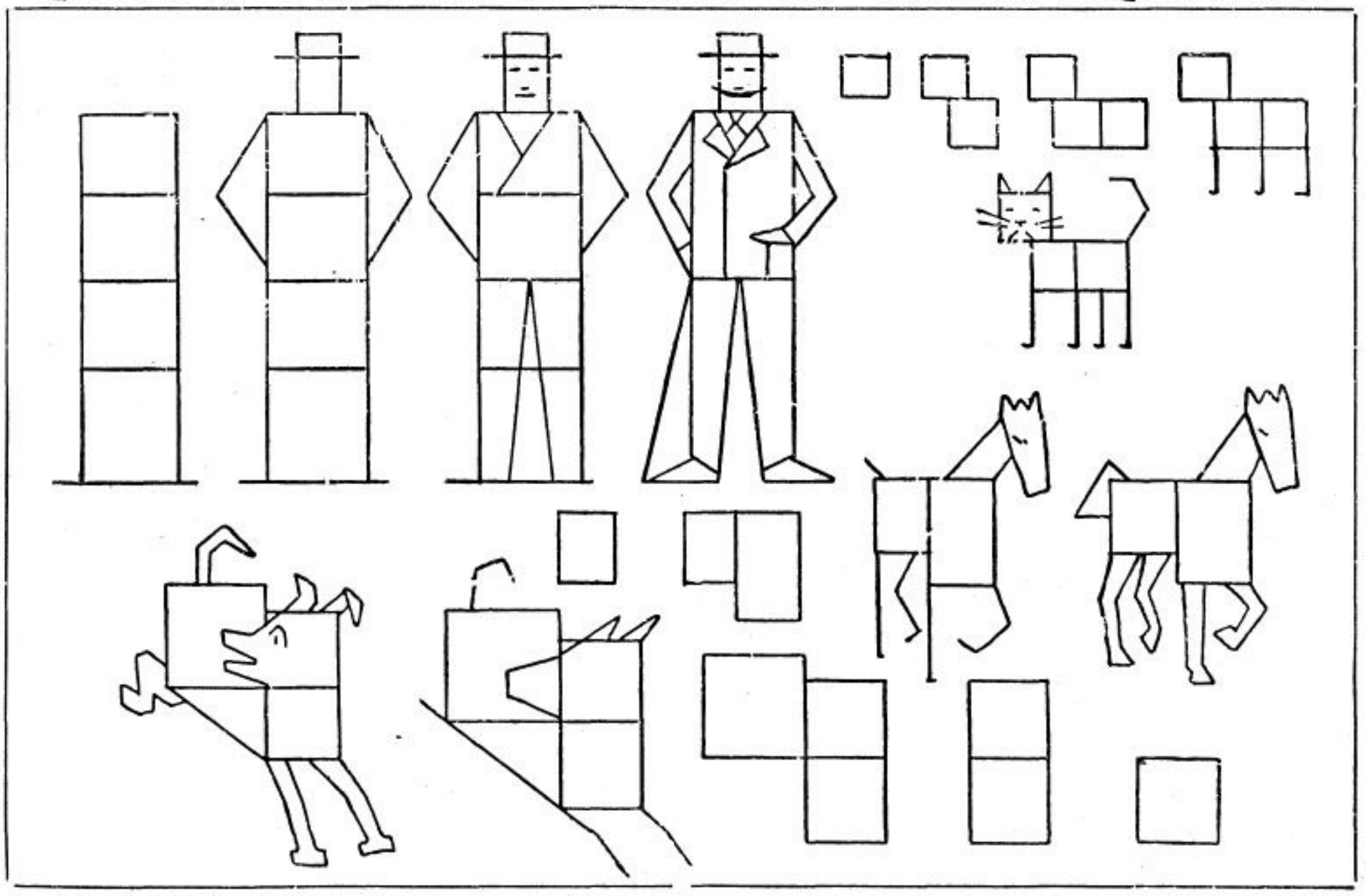
When the varnish is quite hard take the string and make a loop at one end large enough to slip over the projecting point. Then stretch the string to the other end, make a small hole through the peg, and thread the string through it. Now put the bridge into its proper place, as shown in the picture, and make the string tight by turning the peg. When tight, draw the bow across it gently, and if it gives out a clear note the violin is properly made.

Now we shall find that we can amuse ourselves for hours trying to play on it, and we shall be surprised to find how quickly we shall learn to slide our finger up and down the string so as to get the notes we want.

In a few hours we shall have learned to play something, and we shall improve every day.

The instrument is not held like an ordinary violin. The box part is placed between the knees, the string is fingered with the left hand, and the bow is, of course, held in the fingers of the right hand.

QUAINT PICTURES BUILT UP FROM SQUARES



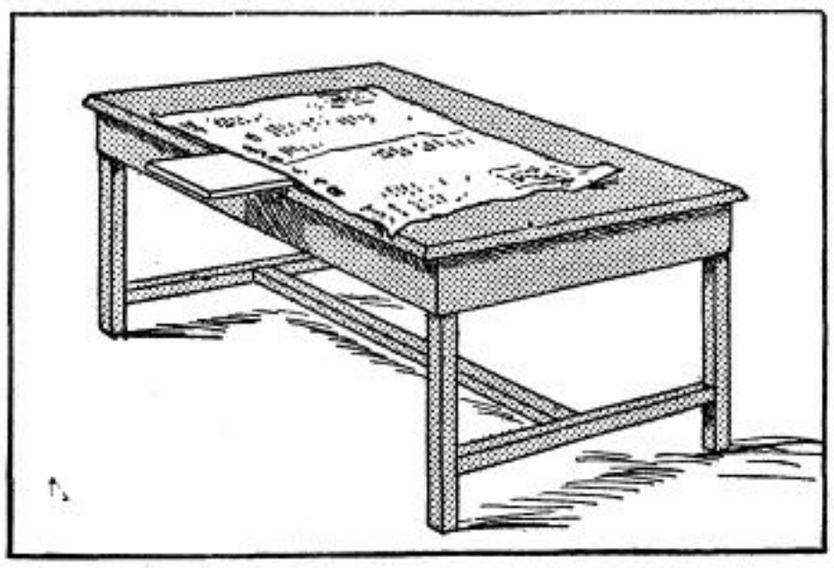
THE quaint system of drawing by using squares as a basis, building up square upon square, and adding what lines are needed to complete the picture, has been invented by a French artist. This group of illustrations shows four subjects, a man, a cat, a horse, and a dog. Look at the man. First four squares are made, one on top of the other; then two lines at each side of the top square give the outline of the arms; a tiny square, a horizontal line, and a rectangle represent the head and the hat; four lines give the features of the face; a series of simple straight lines in the topmost large square make the coat and the tie. The arms are completed in the manner shown. Then an inverted V separates the two legs, the feet are made by two triangles, and the stick and moustache are added; finally the few superfluous lines are rubbed out and the man is complete. To make the cat from three squares as a basis is even simpler, and the method to be followed for it, and also for the horse and the dog, is clearly shown.

HOW TO FEEL THE PRESSURE OF THE AIR

THERE is a very simple scientific experiment by which the pressure of the atmosphere may be felt, and which will, at the same time, cause a great deal of surprise and wonder to those who see the experiment for the first time.

We take a board measuring about two feet long by four or five inches wide, and, say, a quarter of an inch thick. This we place upon a table, with about six inches projecting beyond the table, and cover it with an opened newspaper, as shown in the picture on this page, taking care to smooth the paper down all over so that it may lie as flat as possible on the table.

Now, clenching the hand, we bring it down with a sharp, hard blow upon the projecting wood. One who has never tried the experiment before naturally expects that the board will be knocked down off the table. But no matter how hard we may strike, the board will not go down.



THE BOARD THAT WILL NOT MOVE

The projecting end may be broken off, but the board itself cannot be moved. And yet, if we *press* slowly and gently upon the end with only one finger, the board can easily be pushed to the floor.

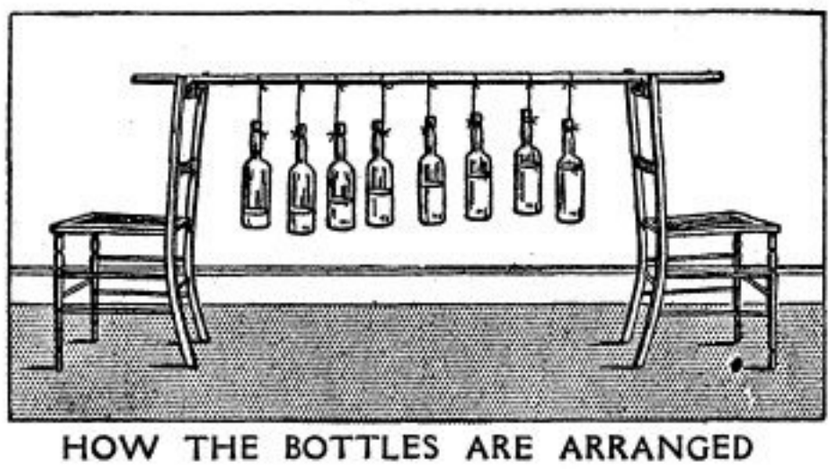
The explanation of the apparent mystery is to be found in the scientific fact of the pressure of the atmosphere. The air presses upon everything on the surface of the earth with a force equal to fifteen pounds on every square inch. But this pressure is unnoticed by us in ordinary circumstances, because it works equally in all directions.

When, however, the pressure of the air is removed from one side of a body, it is felt with great force on the other side. It is this removal of the air-pressure from one side that happens when we strike the projecting end of the board.

The blow is given sharply, and the air has no time to rush in between the table and the newspaper. The result is that the pressure of fifteen pounds to the square inch is exerted in a downward direction only, upon the surface of the paper, and when we strike the end of the board this pressure is felt just as though the other end of the board was held down by heavy weights. It must, of course, be understood that the blow is to be short and sharp, the fist being removed from the board instantly. If the blow is a prolonged one, and the hand rests upon the board for more than a moment, it will go down, because then we are doing practically the same thing as when we deliberately press upon the board. The air has time to rush in under the board, and the pressure of the atmosphere then being the same both below and above the board, there is nothing to counteract our blow as is the case when we strike sharply and quickly, and the air-pressure is exerted on the top of the board only.

A MUSICAL INSTRUMENT MADE FROM OLD BOTTLES

AN amusing and clever musical instrument may be made from a number of old bottles, such as we buy lime-juice or vinegar in. Even medicine bottles will do, but the bottles should be all the same size. Having collected our bottles, we take an ordinary broomstick and rest this on the backs of two chairs as shown in the picture. Then we tie the bottles to this stick, so that they hang loosely and not too close together.



HOW THE BOTTLES ARE ARRANGED

Now comes the work of tuning up, and this we may do by pouring water into the bottles, a different quantity into each, putting more water for a low note and less for a high. To get the note of each, we tap it with a stick—the edge of a boxwood rule is a very good thing for this purpose. With patience and perseverance and a little ordinary care and skill, we shall at last have our bottles all tuned and ready for use, and we can now play this curious instrument by striking the bottles with the edge of the rule. Of course the bottles need to be strong, or the striking would break them, but we need not strike very hard. It will be found that simple tunes can be played on the bottle-bells, and after some practice, we can take two sticks and thus play quicker tunes. It is, of course, essential that the bottles should be hung at such a distance that they do not knock against each other when struck with a rule or stick. Much fun can be obtained from this home-made instrument, which should only be used out of doors, in case the bottles break and the water runs out, although there is no need, if care be exercised, to have any such accident.

LITTLE PROBLEMS FOR CLEVER PEOPLE

THESE problems are continued from page 125, and below are answers to the problems appearing on that page.

14. The Clock Strikes Twelve

George and his sister stood under the church tower and heard the clock strike six. George looked at his watch while it did so, and said to his sister: "It took thirty seconds to strike six." His sister replied: "Then how long would it take to strike twelve?" George replied: "Sixty seconds!" George was wrong. What is the correct answer?

15. How Did He Measure the Milk?

Mrs. Thomson ordered four quarts of milk from her milkman, who had eight quarts in his can, but no measure by which he could measure it. Mrs. Thomson had two jugs, one able to hold five quarts and the other three quarts. The milkman said that he could not measure four quarts with these, but Mrs. Thomson's little boy, Charlie, showed him how to do it. How did he do it?

16. How Many Eggs?

If a hen and a half lays an egg and a half in a day and a half, how many eggs will one hen lay in six days?

17. Twelve Eggs in Basin

There are 12 boys, and on the table is a basin with 12 eggs. Each boy took one egg, and there remained one egg in the basin. How was this?

18. The Farmer and the Tramp

A tramp lies down for a nap at the side of a haystack, and hears the farmer approaching. He runs round and round the stack, chased by the farmer. They start from opposite corners, the tramp taking forty seconds to run completely round, and the farmer thirty seconds. How often must the farmer run round before catching the tramp?

19. How Old is Tommy?

In another three years Tommy will be three times as old as he was three years ago. How old is he now?

THE ANSWERS TO THE PROBLEMS ON PAGE 125

1. No; George never saw the monkey's back, which he clearly would do if he walked round the monkey.

2. Mabel bought six pears, which cost 4d., and six apples at ½d. each, making 3d. for the apples and 7d. for the whole.

3. Mary put the planks as shown in the picture, and thus reached the island.

4. Tom's uncle's sister was Tom's mother.

5. Let us find first of all how many stamps were left when Jack had taken his share. Seeing that Frank had one more than half, Harry must have had one less than half. You know that Harry had three, therefore four must have been half the quantity that Harry and Frank divided. Four is the half of eight, so that Frank had five, which is one more than half of eight. Jack's share was one more than half of the total quantity, and therefore the quantity divided by Frank and Harry must have been one fewer than half of the total. Frank and Harry's share came to eight, as we have seen; and the half of the total quantity, being one more than eight, was nine. Jack had ten, which is one more than half of the total quantity, and there were thus eighteen stamps altogether.

How Mary got the eggs

6. To begin with, one piece of string was 12 in. long and the other piece 24 in. After cutting 6 in. off each, the shorter piece was 6 in. long and the longer piece 18 in. long.

7. If a man says that he has no brothers and sisters, his father would have only one son—himself. Thus, if what he says is put in simple language, it is: "That man's father is myself." This means that the picture at which he looked was that of his own son.

8. As the bottle cost 2d. more than the cork, if we take away that 2d. it leaves the other ½d. to be divided equally between bottle and cork. The cork, then, cost ¼d.

9. Suppose we first give each of the children 1s. each. This will use £2 10s. We have then 10s. left, which is to be used in giving another 3d. each to the boys. Now, there are 40 threepences in 10s. so that there must be 40 boys. Therefore there are 10 girls.

10. The messenger brought 2½ canaries, and 1½ times as many as there were left in the cage. Counting those in the cage, then, there were 2½ times as many as were left, and 2½ canaries. But there were 20 altogether. Taking away the 2½ canaries, we see that 17½ canaries is 2½ times as many as were left in the cage. Or, what is the same thing, 35 canaries is 5 times as many as were left in the cage. There were 7 left in the cage, and so there were 13 which flew away.

11. In fifteen minutes I had gone 1 mile and the horse 220 yards less than 1 mile. In one hour the horse would walk 880 yards less than 4 miles—that is, 3½ miles in one hour.

12. The brick weighed 12 lb. The weight of each of two halves is the same, so that if a brick weighs half its own weight and 6 lb., the 6 lb. must represent the other half.

13. She got 16 for a shilling, being ninepence per dozen. Had there been 18 for a shilling the price would have been eightpence per dozen.

MAKING A BAG FROM A PAIR OF GLOVES

IT is the simplest thing in the world to make a dainty little leather bag out of a pair of old kid gloves. This is how it is done. The gloves must be elbow length, or longer, because it is the " tops " that we are going to use—although the fingers wear into holes, the tops always remain quite good. Tan, brown, navy blue, or black are good shades, because they do not soil; and as we intend our little bag as a kind of purse this is a consideration. Of course, if white gloves are available, we can make an evening bag, big enough to carry a handkerchief and a few little odd things when we go to the theatre or to a party.

We notice that there is a seam down one side of the glove-top. With a sharp pair of scissors we cut down that seam, then right across the glove, and open the piece out flat. This square piece will make one side of the bag, and of course we get the other side from the other glove. We lay these pieces together back to back, and cut them straight, and we shall get two pieces each about seven inches square. If they are big gloves we shall get a larger piece.

THE FINISHED BAG

When we have the outside ready we must think about a lining. A little strip of satin, silk, or wide, soft ribbon will do admirably. It should be of a contrasting colour, or a good match. For the white bag it will be best to choose a delicately coloured lining—pale pink, blue or white. We shall also need a yard of narrow silk cord. It should be the colour of our lining, and we are going to use it for the handle and " draw-up."

Having cut our lining the same shape as the kid, but a little larger, we run round three sides of it with the stuff laid *face to face*. The fourth side is the top, which, of course, we leave open. We now lay this aside and take up the kid part of our bag. We put the two pieces *back to back*, and sew round three sides in an ornamental manner—these stitches are to show. If we look well at the picture, which shows the finished bag, we shall see how the ornamental stitches are managed. The kid has been turned in once, and a stout thread of mercerised cotton or coarse silk of the same shade as the lining has been used to sew the two edges together, over and over, all round the three sides. Care must be taken to keep the stitches as even as possible, and fairly big. When the three sides are done we slip the lining inside, just as it is, and turn in the edges of the kid and the satin at the top, or opening, of the bag, so that they fit together nicely, and then sew them over and over in the same way as the sides were sewn.

Next we make a slot for the cord to run in by a double row of stitching across the top, leaving about 1½ inches for the frill. The slot should be half an inch wide, and must be neatly back-stitched top and bottom. We have now only to work a couple of eyelet-holes at each side, insert the cord with a bodkin, and the bag is finished. If our bodkin-eye will not take the cord, which is generally a trifle too stout to go through, we should sew the cord to the bodkin-eye with a piece of thread. The bag will open and shut more easily if we run the cord round twice instead of once. Then we give each handle a gentle pull, and the mouth of the bag closes.

We need not, of course, keep to the square shape for our bag, for by wasting a little strip of kid we can get an oblong shape, which can be made just as useful. For instance, a bag made of black kid could be lined through with a piece of velvet and made large enough to take a pair of spectacles. This size is best made to fasten with a little pointed flap. On the bag we sew a glove-button, and to the point of our flap make a loop of several threads of silk, buttonhole-stitched over.

HOW FAST DO YOU WALK?

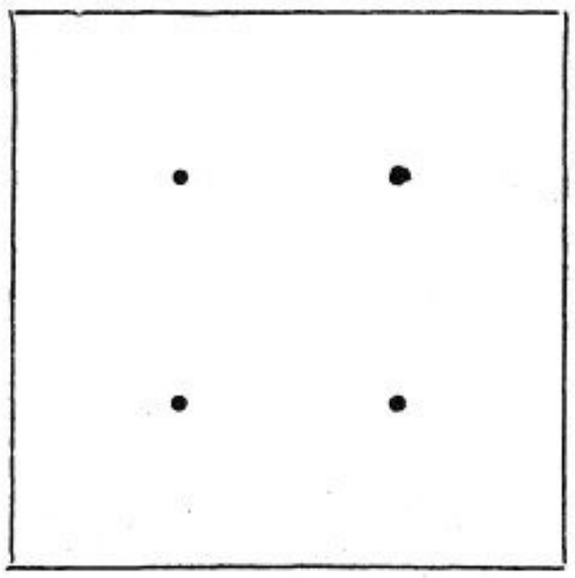
THERE is a very simple way of telling at what speed one walks. Take a piece of thin string, say, 80 to 100 yards long. To one end tie a weight—a piece of lead or other metal, or even a stone. At a point 44 feet from the weight put a knot or a loop. Then put a second knot 44 feet from the first, and so on along the entire length of the string put a series of knots 44 feet from each other.

Take in one hand a watch with a second hand. Now drop the weight upon the ground and walk along at an ordinary pace, letting the weight remain where it fell, and allowing the knots or loops to slip through one hand. The number of knots that pass through the hand in half a minute are the same as the number of miles walked in an hour.

It is always well to know the reason for what we do. It is not enough to know that the number of times we walk 44 feet in half a minute is the same as the number of miles we walk in an hour. We ought to know *why* it is so. The reason is that 44 feet is the 120th part of a mile, because a mile contains 5280 feet, or 1760 yards, and a half-minute is the 120th part of an hour. Therefore we are able to walk 120th of a mile just as many times in 120th of an hour as we can walk a mile in an hour.

THE MYSTERIOUS PURSE

THE young conjurer borrows a sixpence. Taking a piece of paper about four inches square, he lays this on the table, puts the coin in the centre, and folds down the sides over it. There is "no deception" so far; the coin is honestly wrapped in the paper. Picking up the little packet, he asks someone to blow upon it, or does so himself. When he again opens the paper, the sixpence has disappeared, and the owner probably begins to wish he had not lent it. But again the young wizard folds the paper. Once more he blows upon it, and once more unfolds it. The sixpence has come back, and the owner of the coin looks quite cheerful again.

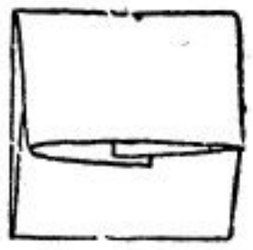


1. PAPER MARKED FOR FOLDING

But our simple-looking bit of paper is not so simple as it looks. In fact, it is a "trick" paper, specially arranged for the purpose

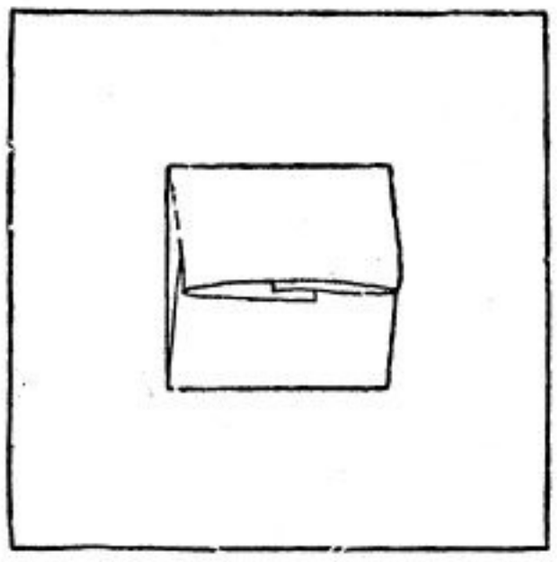
The young conjurer may find some amusement in preparing such a paper for himself. To do so, he should proceed in this way:

Take a half-sheet of ordinary notepaper and fold it in two. Then, with a sharp needle, make four little holes through both thicknesses of the paper, two inches apart, so as to form a square, as shown in the first picture. Then cut apart the two portions of the paper, and fold down the edges of one of them towards the centre, using the needle-marks as guides. The paper thus folded will form a sort of little pocket, or envelope, as in picture 2. Paste or gum this in the centre of the other paper, exactly between the needle-marks. The two together will now look on the one side like picture 3, but on the other side like a plain piece of paper.



2. THE FOLDED PURSE

It is the plain side which, in performing the trick, you show to the company, taking care, by the way, not to show it with a light behind it, which would give away the secret. You then lay the paper, with this side uppermost, on the table. Having placed the coin on the paper, you fold down the edges over it, again using the needle-marks as guides, so as to make the folding correspond exactly with that of the pocket on the other side. The paper will now in reality form two such little pockets, back to back, but if you have done your work neatly, no one will notice that such is the case. In the act of offering the paper to be blown upon, you turn it over so that when you again open it, it is the empty side that you open. When it is blown upon for the second time, you again turn it over so as to bring the side in which you placed the sixpence uppermost.



3. THE BACK OF THE PAPER PREPARED FOR USE

You must, of course, not let the company perceive that you reverse the paper. To do this in proper conjuring style, you should hold it in the first instance clipped between the first and second fingers of the right hand. As you offer it to be blown upon, you must push it upwards with the thumb and clip its outer edge between the thumb and forefinger, when it will have performed an imperceptible somersault. The turn over should be made with the arm in motion, when the greater movement will conceal the less important from the spectators.

The sixpence is brought back again by a repetition of the process. Of course, you are not bound to use a sixpence. A penny or halfpenny, or a bone counter, may be substituted, according to the effect you desire to produce. Further, you may use the paper not only to vanish, but to change one thing into another. For instance, in order to change a sixpence into a farthing, you have only to place a farthing beforehand in the pocket on the reverse or trick side of the paper.

You may use the same paper more than once if you please, but it will in such case show by the creases that it has been previously folded, and the effect is scarcely so good as with a freshly prepared piece of paper.

The method described is the simplest form of the trick. You may improve it considerably by using three pieces of paper instead of one. One of these must be rather smaller, and the other larger, than the trick paper. The smallest we will call number one, the trick paper number two, and the largest paper number three. The first and last are mere plain pieces of paper, but you must have an exact duplicate of number one, and place this beforehand, in the pocket of number two. When working the trick you should, in a careless sort of way, show both sides of number one before wrapping the coin in it. Place this paper, with the coin in it, in number two, and then this latter in number three, first, however, turning it over. The trick is now done. When you come to number two, it is the empty duplicate of number one that you find therein. This you should hand to someone else to open. Numbers one and three being obviously mere ordinary bits of paper, no one will suspect that number two is a fraud.

AMUSEMENT WITH PAPER AND PENCIL

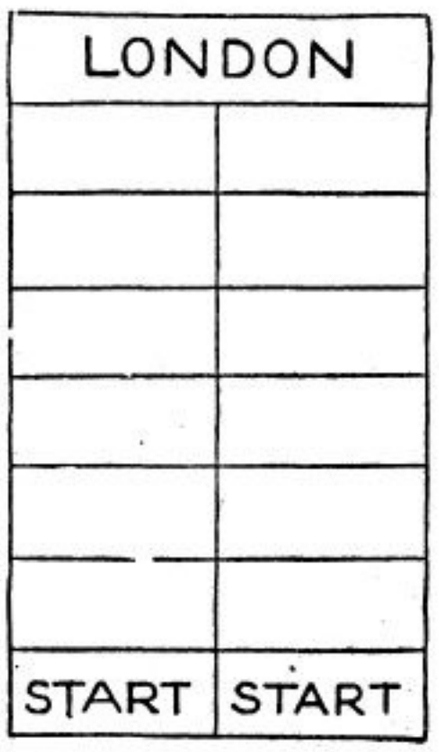
MUCH interest and amusement may be obtained on a rainy day with a pencil and paper, and some of the many games played on paper are given on this page.

INITIALS

EACH player is provided with a sheet of paper and a pencil, and the umpire tells them that they will be asked to write down the name of a tree, an animal, a flower, a bird, a fish, a town, and a country, each beginning with the letter A. This list may be extended by including such names as those of statesmen, cricketers, authors, the umpire fixing the time limit accordingly. Then each player in turn reads out his list, scoring a point for every name that has not been duplicated by someone else. In the second round the letter B is the initial, and so on.

UP TO LONDON

THIS game is for two players. From side to side of the paper a number of lines are drawn, leaving a space at the top and the bottom. A single line is drawn down the middle to divide the paper into halves, and the players take separate sides. A counter is then placed at the starting-point, and the first player flicks it up the paper. If it stops between two lines he draws there a tiny circle to represent a man's head. If, when his turn comes again, he succeeds in flicking the counter into the same space, he may add a body to the head; the third time means legs; the fourth time arms; and the fifth time a stick is drawn in his hands so as to reach across the central line and stop the opponent from drawing any men in the space it enters. Should the opponent have already begun to draw one, it must be rubbed out. The first player to get a man in *all* his spaces wins the game, and the quickest way to do this is to reach "London" every time, for once there means a head in every space, twice there means a body in every space, three times legs, and four times arms. If the counter flies off the paper, or rests on a line, the player scores nothing.

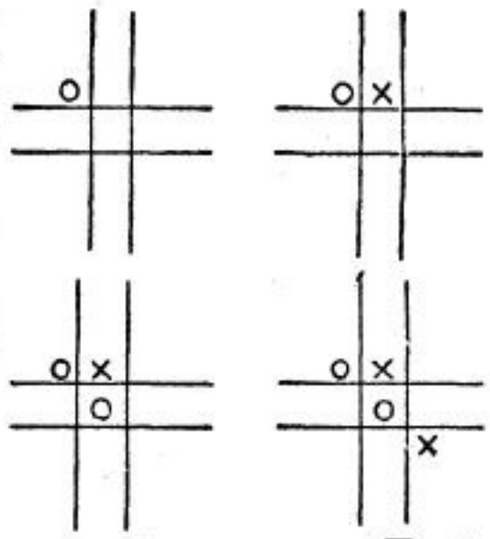


CAPPING VERSES

THE first player writes down a line of poetry, and, hiding it with a piece of paper, hands it to his neighbour, telling him only the last word in the line. The second player must add another line to rhyme with his word, then cover it over and pass the paper on. The third player starts a new rhyme for the fourth to "cap," and so on. The poem is then read aloud.

NOUGHTS AND CROSSES

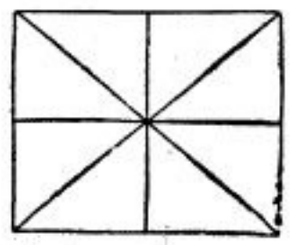
THIS game is played by two players. The paper is ruled with a double cross so as to form nine spaces. One player agrees to be "noughts," and the other "crosses."



If "noughts" begins the game, he does so by drawing a little circle in any space he chooses. The "crosses" does the same with his own mark, and the first to get three of his marks in a line wins the game. This line may be from side to side, or up and down, or from corner to corner. Each player should place his mark so as to take up part of the line his rival is trying to make. The pictures show how the game might begin.

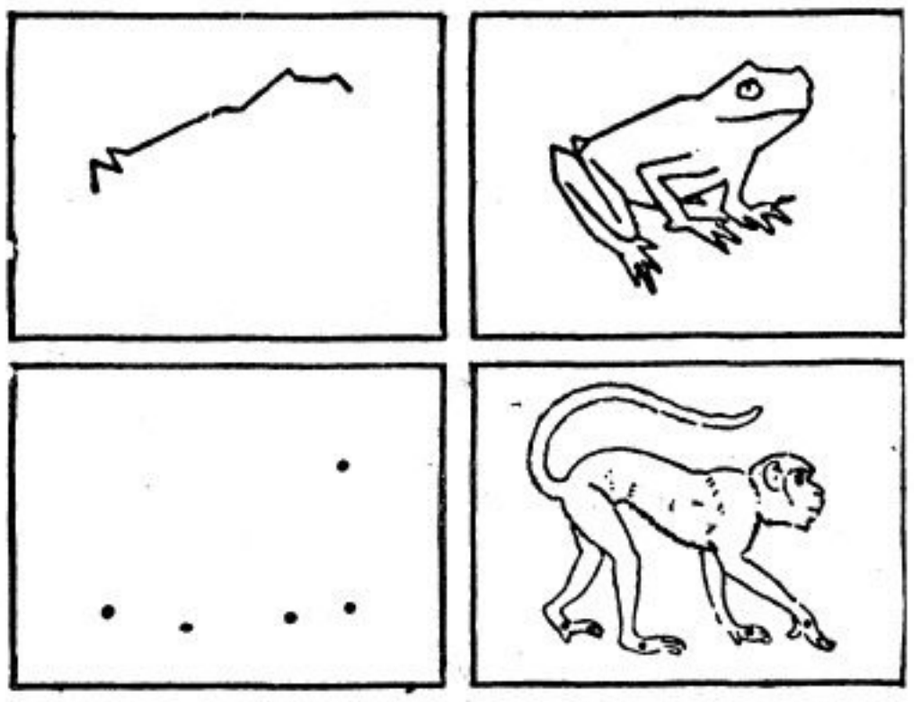
CROSSCROWN

A FIGURE is drawn on the paper like this. Each of the players has three counters, called "men." They take it in turns to place a man at any point they like, where the lines cross in the middle or touch the frame. The first player who is successful in getting his three men in a row is the winner of the game. It is a simple game, but gives a great deal of fun.



OUTLINES

THIS is a most interesting game that can be played with your pencil and paper. At a given word each one scribbles on his or her paper a thick zigzag line, no matter what shape. The pieces of paper are then exchanged, and everyone must try to turn the line into part of a picture. Another way is to make five dots instead of a line—that is, one for the eye, two for the feet, and two for the hands. However awkwardly these dots may be placed, they must be worked into a drawing of some living creature. This is an amusing pastime, but requires some knowledge of drawing.



THE RIGHT WAY TO CLEAN THINGS

THERE is a right way and a wrong way of doing everything. From time to time many things require cleaning: our clothes may become spotted with grease, our fountain-pen may get stopped up, or perhaps we may have been cycling in the rain, and so have smothered our bicycle with mud. When anything like this requires attention the best thing is to clean the article without delay. Here we learn the right way of cleaning several things in everyday use.

TO CLEAN TOOLS

Every tool should have its place in the tool-chest, so that its edge is not blunted by knocking against other tools. Fine tools can be rolled up in a duster to keep them free from rust. Any tool can be protected from rust by greasing it; but should rust attack it we must rub it off with emery-paper.

TO CLEAN KNIVES

We can clean a dirty, greasy knife by running the blade into mould slantwise several times and wiping it with newspaper. Table-knives are cleaned in a knife-machine, or by sprinkling emery-powder on a knife-board and rubbing the blade sideways along this so that the edge of the blade is not blunted.

TO CLEAN A FOUNTAIN PEN

A fountain-pen is liable to get clogged with dried ink and hairs from the writing-paper and pen-wiper. If the pen has a movable point section, we can unscrew it, and let cold water from a tap run through it. The pressure of the water is sufficiently strong to cleanse this part, even through a small opening. The barrel will stand a strong pressure of cold water. It is important to keep the india-rubber bulb and glass dropper rinsed out with cold water after "feeding" the pen, otherwise the ink dries in the bulb and spoils it. If our fountain-pen is a self-filling one we can clean it properly by filling it with cold water and then emptying it several times.

TO CLEAN STAINED CLOTHES

Before being brushed with a clothes-brush, dusty or muddy garments should be well shaken out of doors. It is better to let splashes of mud dry on cloth, and then remove them with a hard brush, always brushing the way of the nap. To rub the splash with a piece of the material itself before applying the brush is a good plan. A grease-spot can sometimes be taken out of cloth or silk with eau-de-Cologne; and when grease is dried on cotton or woollen material it may be removed by moistening it with warm water and soaping it. Benzine is also a good grease-remover.

Another method is to place a piece of blotting-paper or porous brown paper over the spot and press a hot iron on it, moving the paper every now and then until the grease is completely absorbed. Black cloth is freshened by sponging with cold tea or ammonia diluted with water. Lay the cloth flat on a table and sponge very carefully, moistening the sponge every now and then, and hang the cloth in the air to dry. Dirt-marks can be removed by rubbing them with rag dipped in petrol, but the petrol must not be used near a light or fire. Ink-spots can be removed by rubbing with milk or salt. This must be done at once, otherwise the application is of no use. If the ink-spots are old, the best method is to soap them and then lay a little salts of lemon or salts of sorrel on them; but the salts must not be rubbed in, or a hole may be made in the material.

TO CLEAN PAINT

Dirty painted woodwork should be first dusted and then washed with a soft cloth in warm soapy water. Very hot water and a hard brush spoil the paint. Go over the surface with a chamois leather which has been wrung out in cold water. Polish till dry.

We can remove paint from brushes by dipping them in linseed oil or turpentine, and washing them in soap and water in the palm of the hand. The soap must be rinsed out in clean water, and the bristles shaped to a point, before being stood upright to dry.

TO CLEAN DIRTY WET BOOTS

If the boots are very muddy the mud can be wiped off with a damp cloth; cakes of it may be removed with a knife, but this needs skilful doing, or the leather may be cut. Wet boots should not be dried before a fierce fire, for great heat impoverishes the leather. It is better to place them on their sides in a room or passage where there is a good draught. When dry, any remaining dirt can be brushed off before the boots are blacked in the usual way.

TO CLEAN A BICYCLE

When the bicycle is brought home wet and muddy we should wipe the spokes and enamelled parts with a cloth. Paraffin will clean the chain, and one of the numerous plate polishes will clean the nickelled parts. The chain may be brushed over with graphite or some preparation containing blacklead. Tyres must be wiped clean with a wet house-flannel. The best way to clean the bearings is to run paraffin through them until the dirt has been washed out, and then to apply lubricating oil.

TO CLEAN A SPONGE

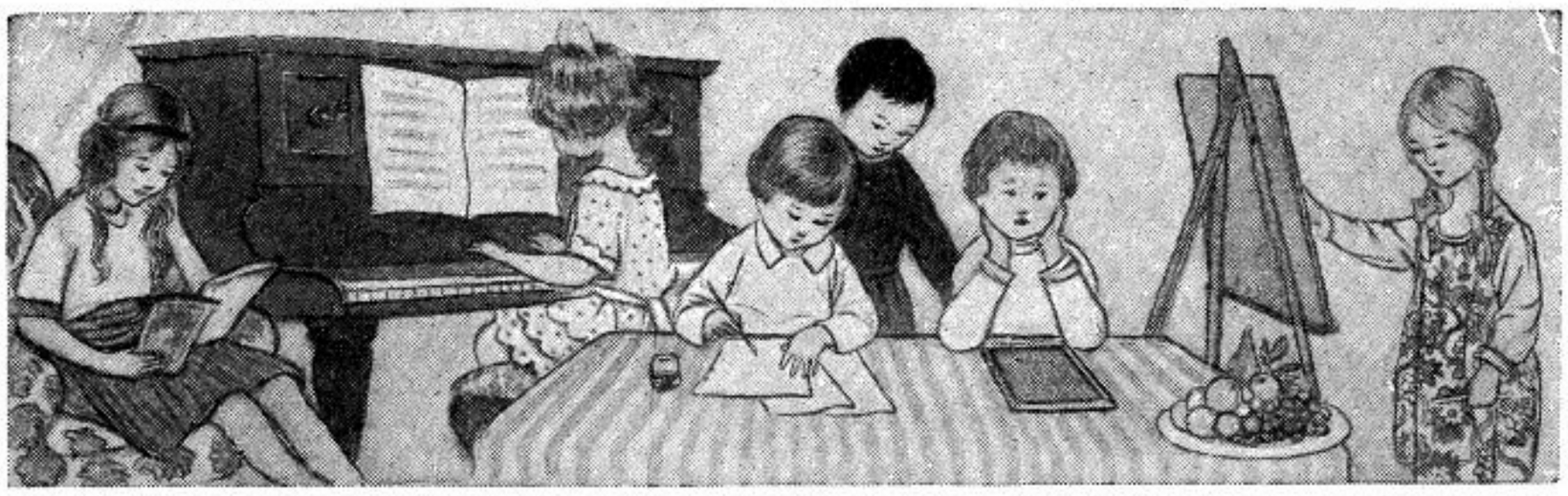
Sponges are liable to become disagreeable and slimy if used long without being cleaned. This can be done by washing the sponge in ammonia and hot water, and then leaving it for some hours to soak in cold water in which some coarse salt has been dissolved. Soaking in sea-water, its native element, freshens up a sponge. Vinegar can be substituted for ammonia, if we do not object to the smell.

TO CLEAN BOTTLES

A glass bottle can be cleaned by pouring some household ammonia into it; shake it well, empty it, and rinse it clean with warm water. If the neck be wide, tea-leaves, or small pieces of a raw potato mixed with salt and water can be shaken up in the bottle.

SCHOOL LESSONS

Simple Learning Made Easy for Very Little People



READING—LEARNING THE SMALL LETTERS

MOTHER said there were still a few more letters to learn, and then they would know them all. The new ones she would tell them about are called Small letters.

Then I suppose our old ones are called Large ones ? said Betty.

No, said Mother, we can't call them large because we might print a large copy of a small letter and a small copy of a large one, and that would be very puzzling. No, the first letters you learned have a long name, and you know how you love long names. They are called Capital letters.

Capital is a hard word to say, and it means a head. We always use these for the names of people, like Billy and Betty and Fido.

I know why they are called capitals ! said Billy. It's because all people who have a name have a head ; isn't it ?

Perhaps so, said Mother. But I must tell you that we also use capital letters for names of places, like London and Brighton. And the names of the days of the week, like Monday, Tuesday, Wednesday. And the months of the year, May, June, July. All written with a capital letter.

And now we will get on with our small letters. Some of them are like the capitals and some are not, and when you know them you can match them up to their capitals.

I am sorry to say that we have no nice bricks with the small letters, because the toyshop people never remember that little children want small letters much more than capitals. But Daddy has printed some on these pink tickets, and you can learn them as you learned the capitals.

I have put them in the right order inside these little boxes, as I did before, so now you can learn them by yourselves while I go and make some cakes.

So the twins looked carefully at the cards and learned their small letters.

a b c d e f g

h i j k l m n

o p q r s t u

v w x y z

Then they put the small ones under the capitals, like this :

A B C D E F G

a b c d e f g

H I J K L M N

h i j k l m n

O P Q R S T U

o p q r s t u

V W X Y Z

v w x y z

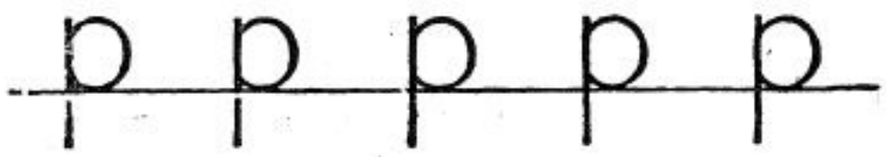
Tomorrow, said Mother, we'll get out that beautiful picture book that Auntie gave you, and begin to learn how to read real words.

WRITING—STROKES AND CROOKS

Now, said Mother, we are going to make a few more bun letters, and then try some letters that are quite different.

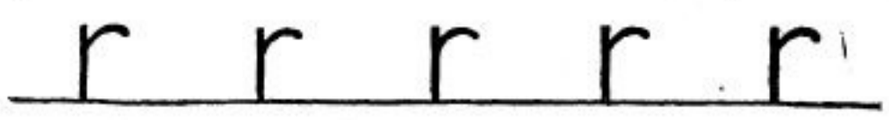
Big P's bun goes above the line.

Little p's bun rests *on* the line.



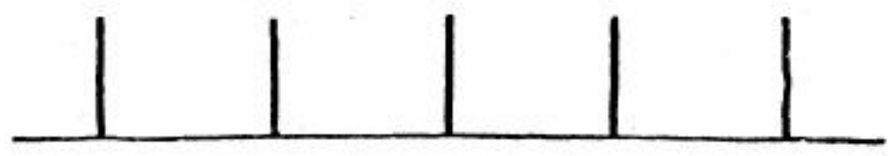
P for Polly and Peter Piper,
p for pen and pencil and paper.
A stroke, a bun, and a leg out far,
So we make a capital R.

R for Robert and Robin Redbreast,
r for rabbits running a race.
R r for Ring-a-ring-a-roses,
P p for Pockets full of posies.
A *little* stroke and arm out far,
So we make the little r.

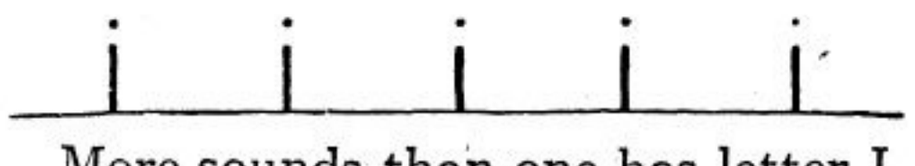


The next family of letters, said Mother, are nearly all made of strokes and little crooks.

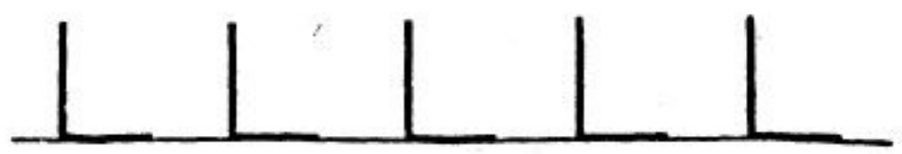
This long, tall stroke is capital I.



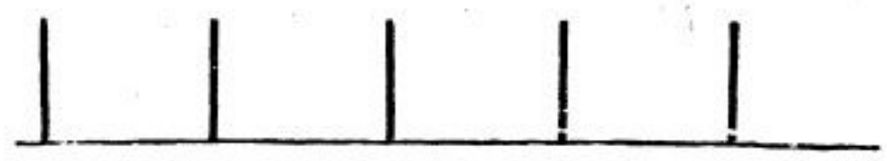
Small i is only half as tall :
See him playing with his ball.



More sounds than one has letter I,
We will learn them by and by.

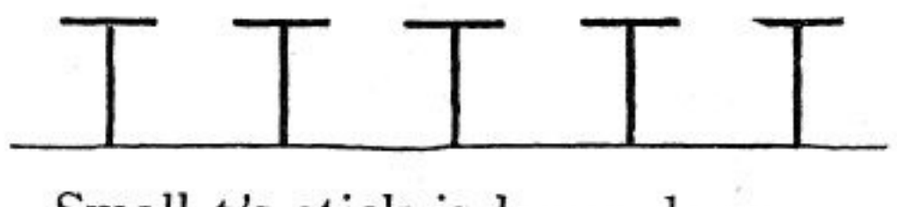


Capital L has a foot and is tall.
Small l has no foot at all.



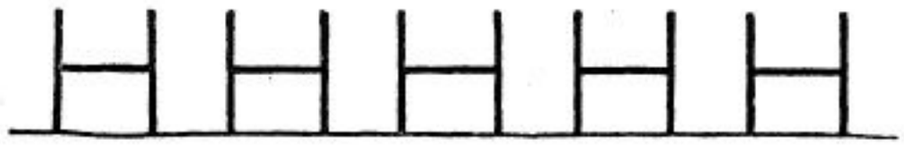
L for Louie and Lucy Locket,
l for lost and Mother's locket.

Capital T has his stick on his head.
T for Tommy and T for Ted.

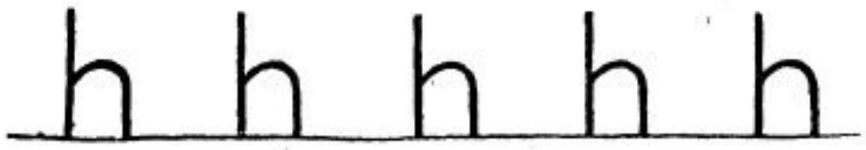


Small t's stick is lower down,
t for the toys we buy in the town.

Like a little stile is capital H.

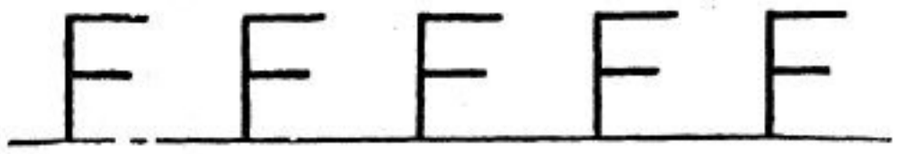


On letter H we breathe very hard:
Humpty-Dumpty, Handy-Spandy.



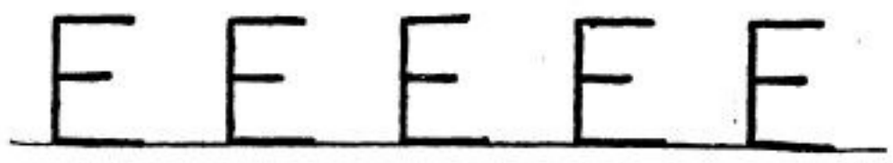
Like a little chair is little h.
h for head and h for hat,
h for hand and h for handy.

Capital F is like a signal,
F for Fanny, F for Fan.



Small f is like a sheaf of corn.
f for fat and f for fan.

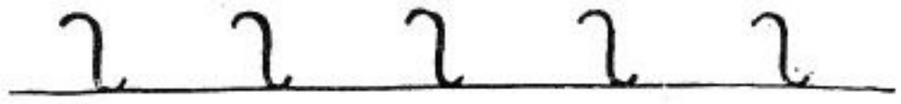
A bottom stroke to F we see,
So we make a capital E.



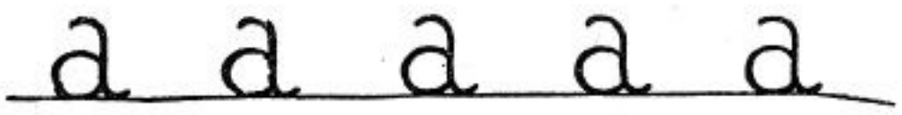
e is not so easy,
See my pencil go ;
A straight line with an arch on top
And a curly tail below.

Now we'll make a little hill,
Much too small for Jack and Jill,
Now a path across we'll lay,
So we make a capital A.

Bopeep's crook, then Mother's meat-hook,
Make it carefully all the way.



Put the meat upon the hook,
So we make a little a.



The children found the little a rather difficult to make.

Ours aren't a bit like Mother's! cried Betty.

Never mind, said Mother; do your best, and another day I'll show you how to write it an easier way.

To make this print a we will try,
We'll learn an easy one by and by.

Stretch big K's legs out a bit,
K for Katy, K for Kit.

Out the small k's legs do stick,
k for kiss and k for kick.

Like a swing is capital M

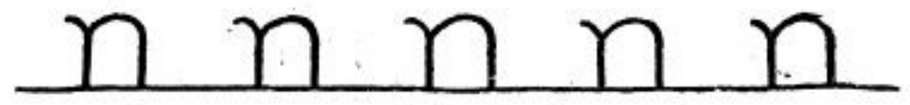
Three small crooks make little m:

M for Milly, Mary, May,
m for must and m for may.

Two tall lines, a slant between,
So the capital N is seen.

N for Nell and N for Nelly,
N for Ned and N for Neddy.

Two small crooks instead of three,
Here the little n we see.



n for nasty, n for nice;
m for mouse and m for mice.

COUNTING—A LITTLE TALK ABOUT NOUGHT

THE next day Mother said: Now we will have a little chat about that round one, o, at the end of 10. What do you think it stands for? It stands for NO THINGS—NONE, and so it does not often stand alone.

If you ate up all the cakes there would be none left, and we should write down none, not o by itself. But we often want o when we are doing the sums we shall have to do by and by, so don't forget it.

Some people put o before 1 and stop at 9, but that would spoil our nice rhyme about catching our fish alive. There is a glad nothing and there is a sad nothing. If we had no houses or no loaves of bread or no babies in the world that would be very sad, but when I look at your socks and see no holes then I am glad.

And we are sad when we open our purses and find no pennies in, aren't we, Betty? said Billy.

Yes; but we liked the nice sweets we bought with our pennies, said little Betty.

Now let us have a little chat about 1, shall we? said Mother. It is such an easy number to write and to count. Tell me some things we only have 1 of.

Betty and Billy guessed—One head, one nose (how funny it would be to have two!), one neck. One father, one mother, and one baby. One teapot at tea-time, one milk-jug, one sugar-basin.

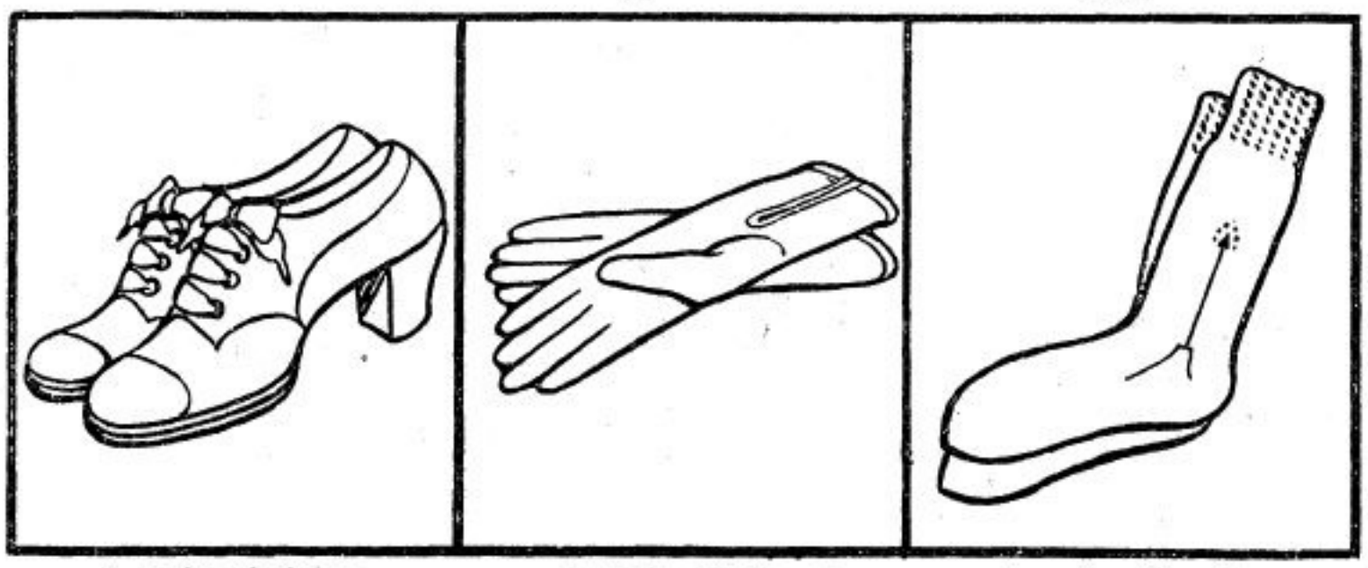
Yes, said Mother, and one lump of sugar in your tea.

If it is a big one, said Billy.

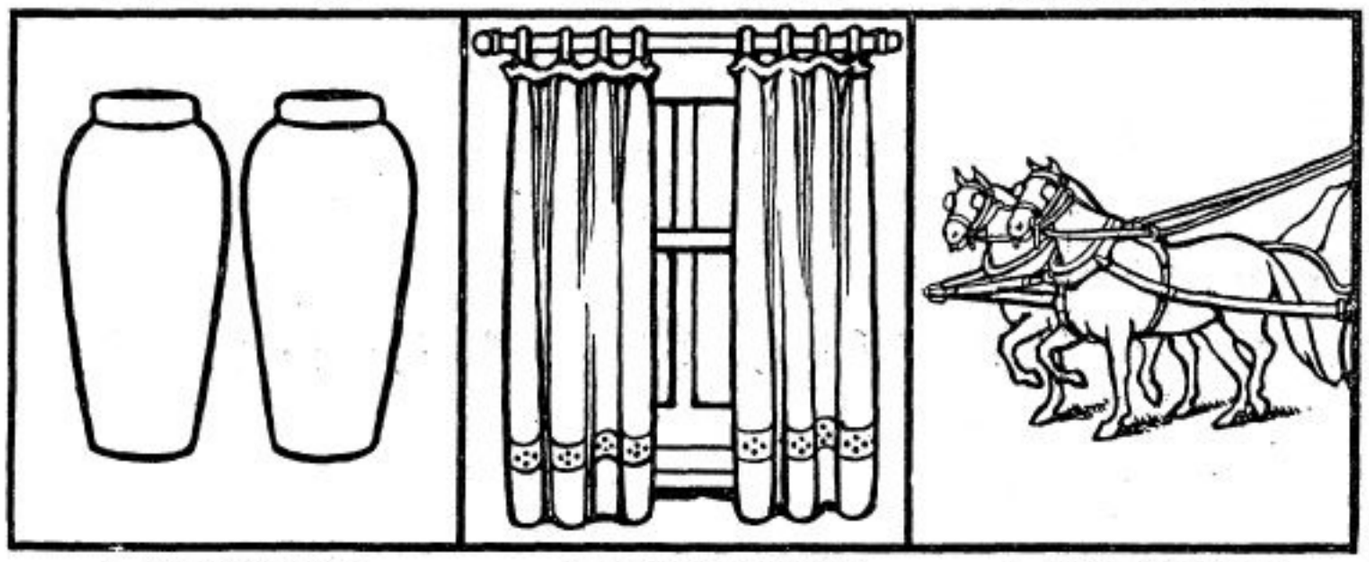
Then Mother told them of some things we never have one of, like measles, and some things we never want to have one of, like a bad cough, or a tumble down the stairs !

Two is such a nice number to think about, said Mother. Tell me some things we have two of.

The children guessed; Two eyes and two ears, two hands and two arms, and two legs and two feet. Such a lot of twos of things.



A pair of shoes | A pair of gloves | A pair of socks



A pair of vases | A pair of curtains | A pair of horses

When two things are alike, or nearly alike, and go together we call them pairs, said Mother. Let us think of some.

They thought of all these pairs :

A pair of shoes, a pair of gloves, a pair of socks, a pair of vases, a pair of curtains, a pair of horses.

And Billy and I are a pair of twins ! said Betty.

Now, said Mother, all these pairs of things belong together, but they are not joined together. Can you think of any pairs of things which are joined ?

So they thought of a pair of scissors, a pair of eyeglasses, and a pair of knickers.

Then Billy and Betty played some new games. They played with their Noah's Ark, where " the animals went in two by two," and they played with their bricks, placing them in twos like soldiers marching, or the choir boys and men walking up the church.

When Daddy came home he asked the twins all sorts of funny little questions like these :

Which would you rather have, 1 bad egg or 2 bad eggs ?

Which would you rather have, 2 coughs or 1 cough ?

Which would you rather have, 2 children in one bed or 1 bed in 2 children ?

Which would you rather have, 1 head and 2 hats or 2 heads and 1 hat ?

Which would you rather have, 1 daddy and 1 mummy or 2 daddies?

I need not tell you what Betty and Billy said, need I?

Then their Mother came in and sang them this little song:

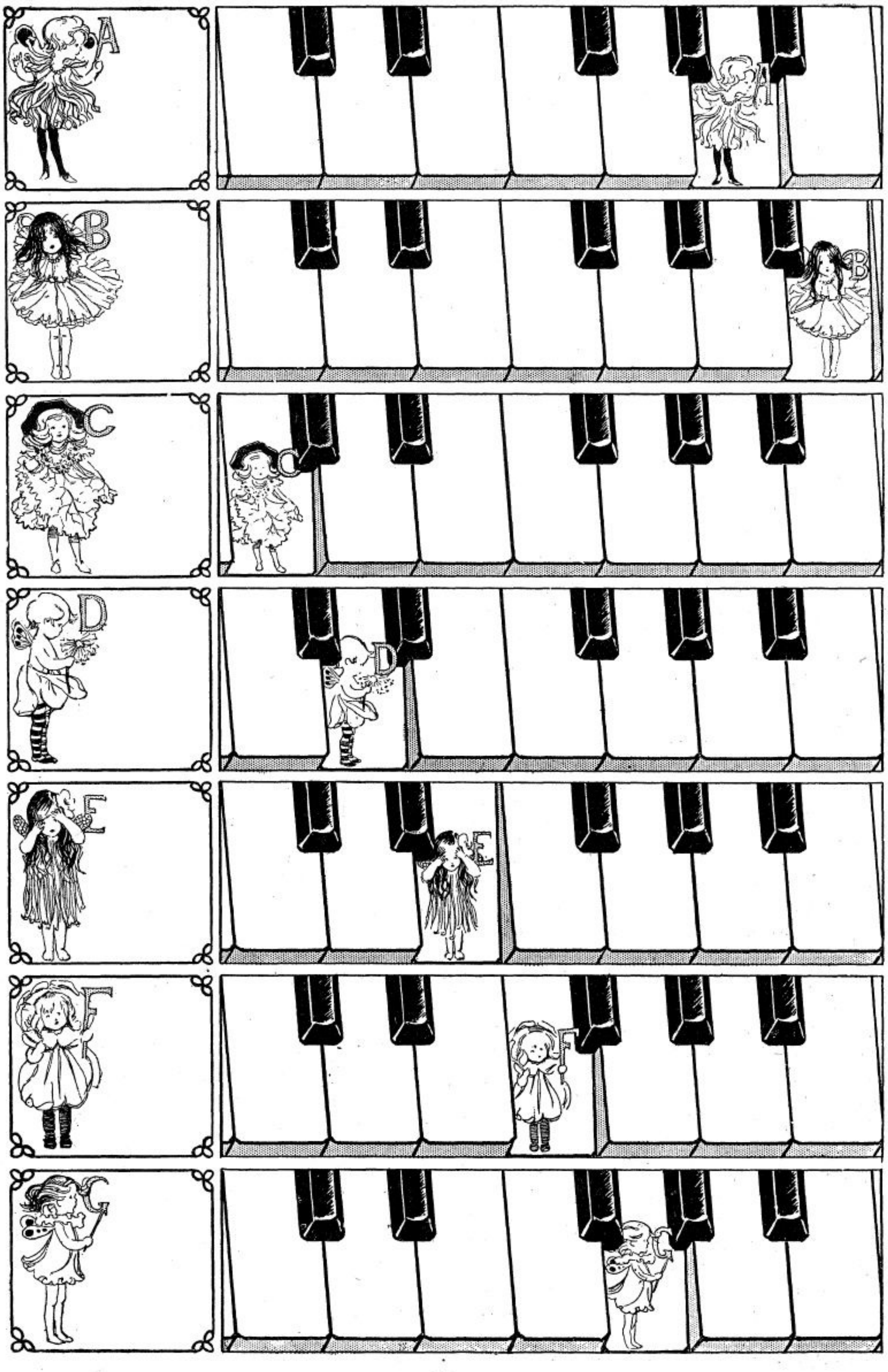
Two little dogs sat by the fireside
In a basket warm and woolly ;
One ran away, and the other would not stay
In a basket warm and woolly.

Then Daddy made up a little song something like it :

Two little twins sat by their Daddy's side
When their Mummy said " Now it's bedtime."
One ran away and the other would not stay
When their Mummy said " Now it's bedtime."

So off went the twins to bed, and I hope they did not dream of ones and twos !

THE LITTLE PIANO FAIRIES IN THEIR HOMES



MUSIC—ANOTHER GAME WITH THE PIANO FAIRIES

ONCE upon a time, in a country far away, a very beautiful flower was found. It was so beautiful that all the people in the land wondered. But there was in this country a little girl who loved the flowers very much, and when she heard everyone talking about the beauty of this little blossom she thought she would like to go and talk to it. Day after day the tiny girl bent over the flower, and in time she learned its secret, which could only be whispered into the ears of a loving little child. The flower told her she might tell this secret to all who wanted to learn about the beautiful; and this is what it was.

In the flower lived a fair and noble princess. No one ever saw her, but her great beauty and goodness shone through the flower and made a wonderful light, which was so beautiful that all who saw it were made glad.

Now, our seven little fairies are very much like the good and beautiful princess, only instead of living in a flower they live in our Magic Kingdom, the pianoforte; and instead of shedding a beautiful light they speak to us, if we will let them, through their sweet voices.

Would it not be delightful if you and I could know each fairy voice so well, directly we thought of one of our seven little friends, that we could sing her note?

Well, there is only one thing to do. We must ask the fairies to play another game. We will knock first at Fairy C's door. We will choose that house of hers which is almost in the middle of the long white line, remembering that her houses are always found on the left-hand side of the group of two goblins' houses.

To knock at her door and hear her voice in answer, we must press down the little white piece very gently, very firmly.

Listen! Do you hear her? It is Fairy C's voice. We will try if we can sing the same sound exactly. Try it a great many times, and then, when we think we know it quite well, we will run away to the end of the room and sing it again, coming back very quickly to our Magic Kingdom to see if we have remembered it rightly.

Fairy C likes to hear us say, "This is Fairy C's voice," and she will always sing to us if we go to her house, C, and press the door very gently and firmly.

When we have played as long as we like with Fairy C we may go to her next-door neighbour, Fairy D. Fairy D's voice is not quite like Fairy C's, is it? We will press the door here too, and listen to the answer, and then try to sing the same sound.

But we must not forget Fairy C's voice, so we will touch the door again gently and listen. Now we will go back to Fairy D, to be quite sure that we know each fairy's voice.

But we must not forget that there are more fairies, and so we go to Fairy E's house and learn her little "note," and then to Fairy F and Fairy G, until we reach Fairy C's second little house.

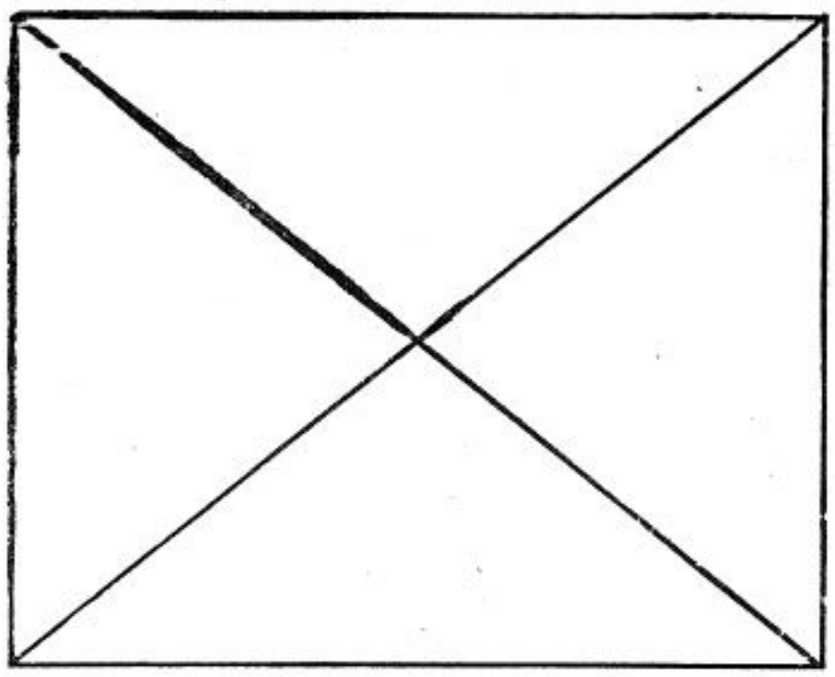
If we have a fairy concert every day, we shall soon come to know all the beautiful fairy voices quite well.

DRAWING—HOW TO DRAW A PLAIN ENVELOPE

WE must learn next how to use our pencil properly. We shall want some more materials, and it is well to have everything ready before we begin.

First, get a large sheet of white cartridge paper, and pin it on to the drawing-board with drawing-pins. You will also need an ordinary drawing pencil, marked with a *B* next to the maker's name. Do not get any india-rubber. See that your paint-box and paint-brushes are quite clean, and that the jar of water is ready too. You will want a cheap sponge and a piece of clean white blotting-paper—though you will only want to use a pencil for the first part of the lesson, it is well to have everything ready before you start.

Sometimes it is difficult to find chalk or charcoal directly you want it, but you can generally find a pencil and a piece of paper. But as we should always be trying to draw the things we see around, it would be nice to have a drawing-book that we can carry about. But remember not to make tiny sketches, but always to draw as big as the paper will let you. Before you begin, just think where your drawing will look nicest on the page. Do not squeeze it up too much in a corner. Put it in the middle and leave a small margin round.



THE BACK OF THE ENVELOPE

We will start with something very easy this time, but be very careful about the pencil you use and the way you hold it. If it is a new one, it is rather long for little fingers. Ask someone to cut it in two, and to sharpen one piece so that it has a flat point like the edge of a chisel. The other one should be sharpened just in the ordinary way.

Remember to hold your pencil half-way down and use the flat side of the point; and begin drawing on the left-hand side.

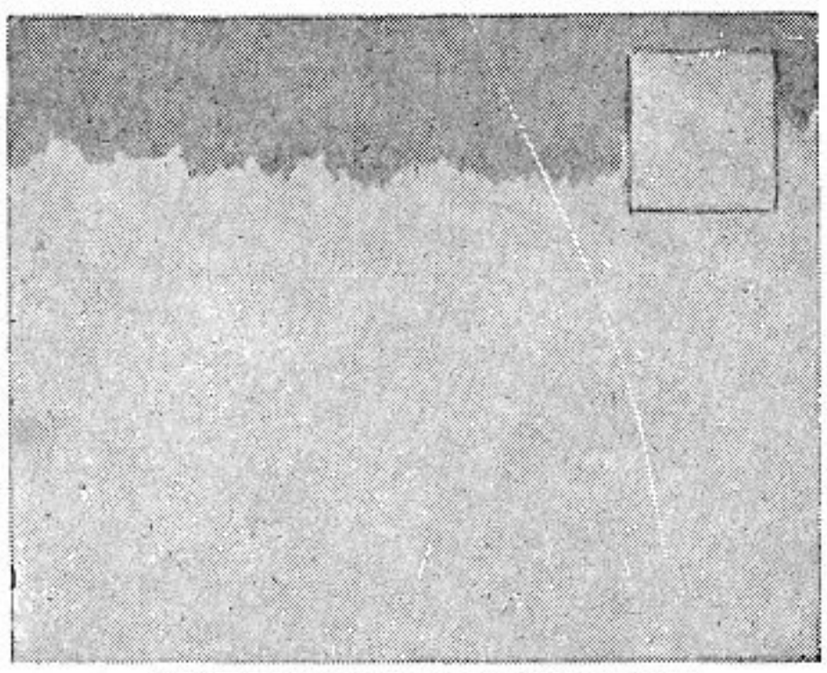
Now get a large envelope. If its sides are all equal it is a square one; but if it has two long sides and two short ones it is an oblong one. It does not matter which shape you use, but you must think how you will place it on the paper, as it is to be drawn six times over.

Put the envelope on the paper at the right-hand top corner, and, using the pencil with the ordinary point, make a line all round the edge. Take the envelope away and there will be pencil lines like the shape of the envelope. But perhaps the four corners will not be finished nicely; if so you must join them properly. Now put the envelope again on the paper, in the left-hand corner this time, and make four dots where the corners are. Take the envelope away and try to join the dots together, using the pencil with the chisel-point. Now, underneath the first drawing, try to make a copy of it without using any dots. Do this three times, and the last two ought to be good enough to paint.

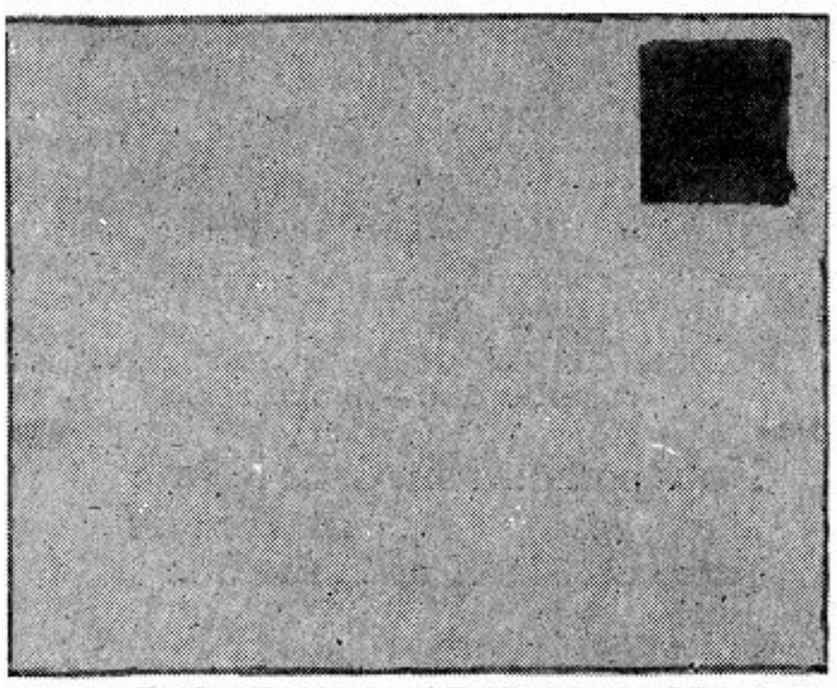
Choose the two best, and in the corner of one draw a stamp; on the other draw lines across from corner to corner to make it look like the back of the envelope. You can chalk or paint the stamp its colour and write the address. Perhaps you would like to paint the envelope pale blue.

First dip your sponge in water and damp the place you want to paint all over—it must not be too wet, only damp. Hold the paper level with your eyes; if it shines or glistens it is too wet, and you must blot it with the clean blotting-paper till it is not shiny at all. Now mix some cobalt blue with a good deal of water to make it pale. Take a good brushful of colour and pass the brush quickly across the top line from left to right. Go back to the left again, and put on the colour with short, downward strokes of the brush, going toward the right and leaving the stamp white.

Repeat this till you have filled up the space, taking a fresh brushful of colour at the beginning of each row. You will find that you have a pool of wet colour lying along the bottom line when you reach it. Get your brush quite clean and nearly dry, drag it through this pool, and it will take away all the colour that you do not want.



PUTTING ON A FLAT WASH

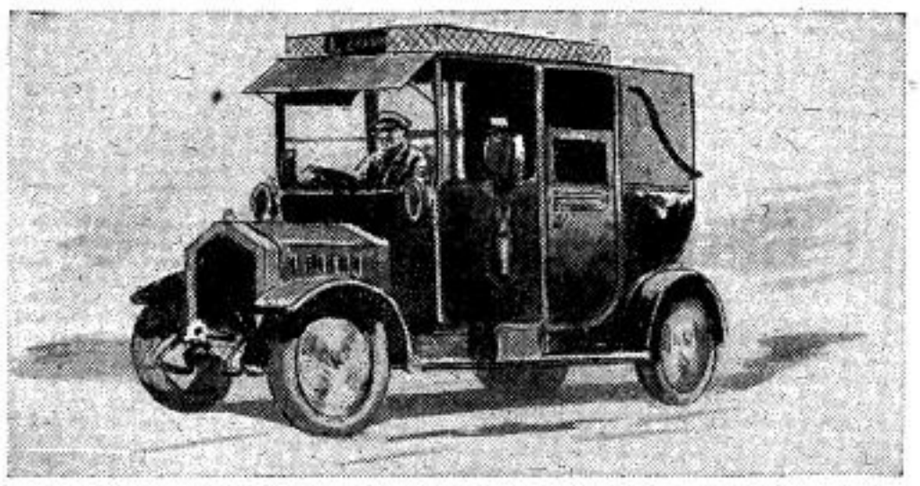


THE STAMP MUST BE COLOURED

This way of painting is called putting on a flat wash. It ought to look quite smooth and even, but it needs a great deal of practice. The blue wash must be quite dry before you paint the stamp, or the edges will run together.

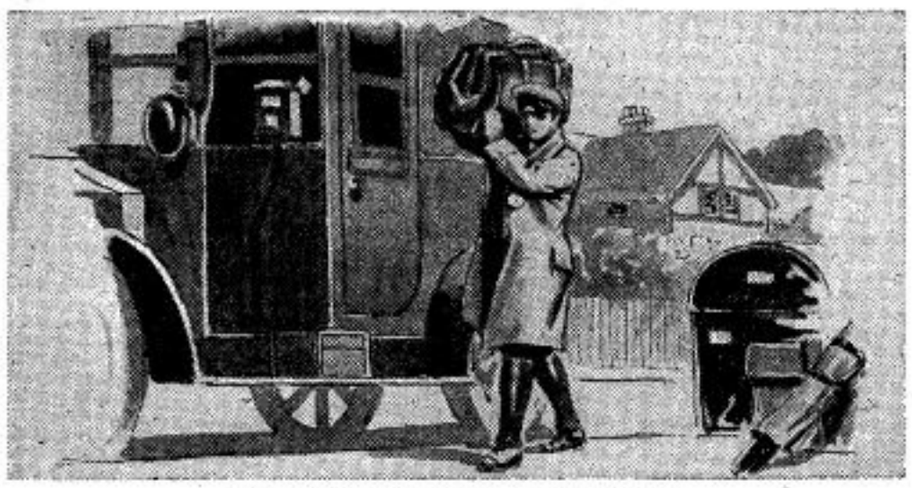
FRENCH—A LITTLE PICTURE LESSON

HERE we read of the arrival at the railway station. We must remember that the first line under the picture is the French, the second gives the English word for the French word above it, and the third line shows how we make up the words into our own language.



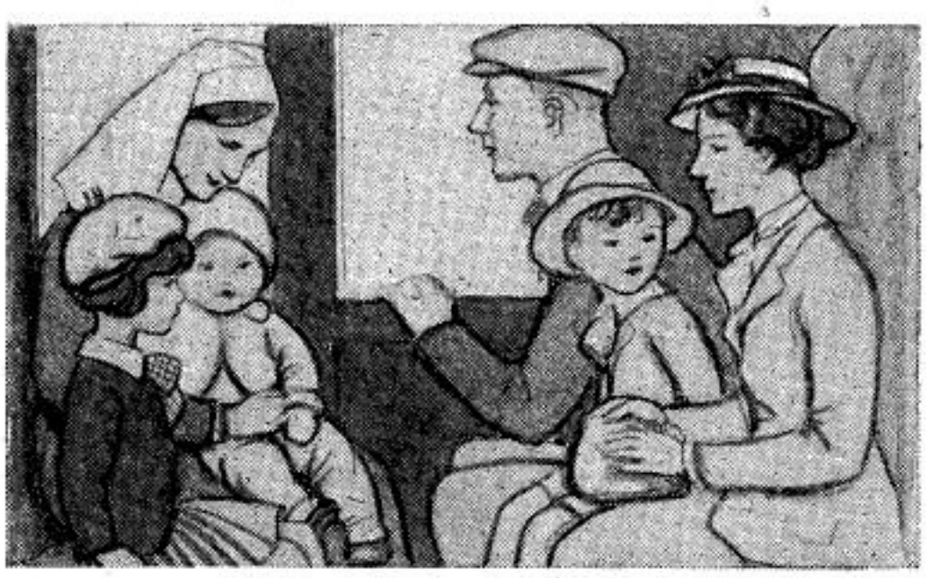
Le taxi—The taxi

Le taxi arrive à la porte
The taxi arrives at the door
The taxi arrives at the door



Le chauffeur—The driver

Le chauffeur met les bagages sur le taxi
The driver puts the luggage on the taxi
The driver is putting the luggage on the taxi

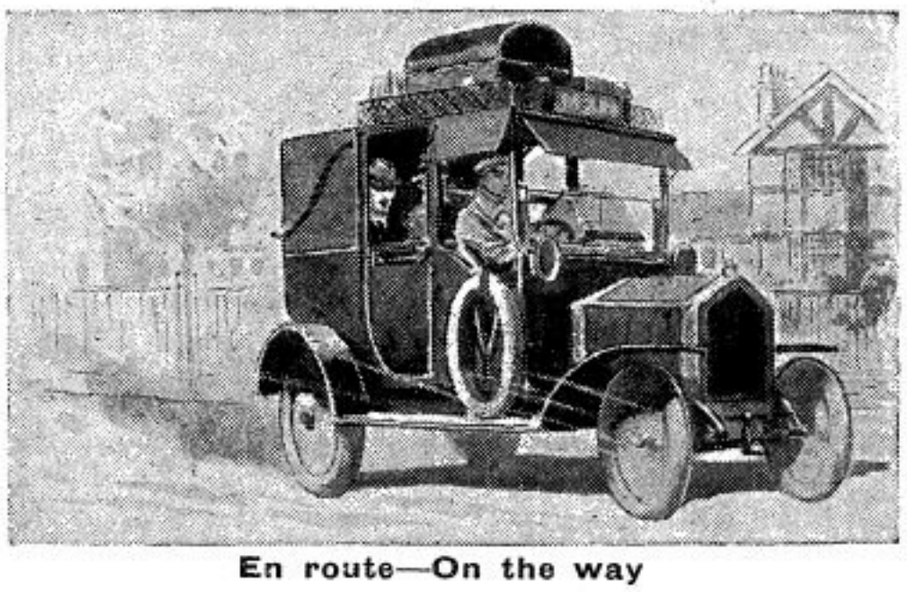


Dans le taxi—In the taxi

Nous sommes six dans le taxi
We are six in the taxi
There are six of us in the taxi

1	2	3
Un	deux	trois
One	*two*	*three*
4	**5**	**6**
quatre	cinq	six
four	*five*	*six*

Nous aimons aller en taxi
We like to go in taxi
We like riding in a taxi



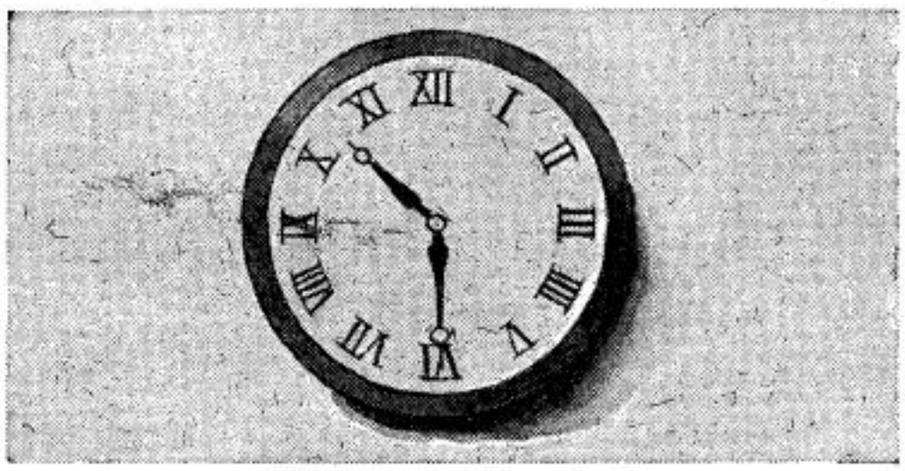
En route—On the way

Le taxi va très bien
The taxi goes very well
The taxi goes very well

La gare—The station

Nous arriverons bientôt à la gare
We shall arrive soon at the station
We shall soon arrive at the station

Nous sommes maintenant à la gare
We are now at the station
We are now at the station

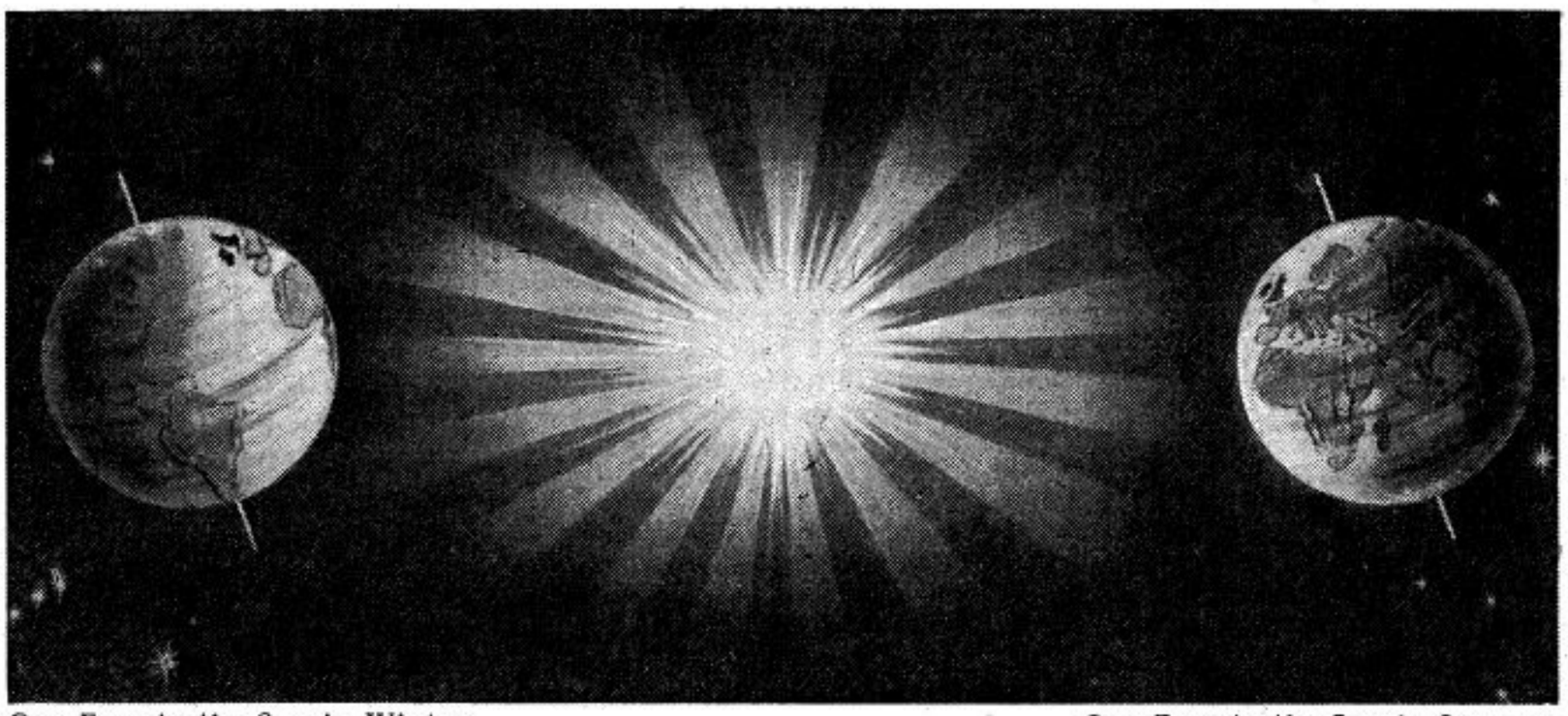


L'horloge—The clock

Il y a une grande horloge à la gare
There is a big clock at the station
There is a big clock in the station

Il est dix heures et demie du matin
It is ten hours and a half of the morning
It is half-past ten in the morning

The Story of the Boundless Universe and All Its Wondrous Worlds



Our Face to the Sun in Winter — Our Face to the Sun in Summer

THREE WAYS THE EARTH MOVES

THE first thing we are inclined to say when we are told the Earth moves is that we do not feel it moving, but the answer to that is easy.

When you are in a train in a station, you sometimes cannot tell whether the train is moving or not, except, perhaps, by looking at another train standing at the other platform, and sometimes you think your train is moving, until you see that the platform is quite still. It was the moving of the other train that made you think *your* train was moving.

So it proves nothing to say that we do not feel the Earth moving with us. If you are travelling in a train, or on a boat, or in a balloon, or on this great Earth, you have only two ways of judging whether you are moving or not. One is by feeling the movement under you, and the other by noticing that things outside seem to be moving past you.

Now, certainly we cannot feel the Earth move under us, but this is simply because the movement is so smooth. The best proof of the smoothness of the Earth's motion is that no one has ever felt it moving. Sometimes a little bit of the outside of it moves by itself, and then people feel it. That is called an earthquake, and is quite different. No one has ever felt the movement of the Earth as a whole.

What would happen if the Earth suddenly stopped moving? If suddenly it *did* stop moving, as a bus pulls up sharp, or as you pull your arm up sharp when you throw a ball, what would happen to us? When a bus stops suddenly all the passengers are jerked forward. The Earth is going so fast that if it were suddenly to stop moving all the loose things on it, and many of the fixed things on it, would be hurled across space. Indeed, the shock would render the Earth red-hot and probably tear it to pieces. But nothing except collision with a sun or a planet could stop the motion of the Earth, and there seems to be no likelihood of such a collision occurring. The Earth is likely to rush on smoothly for thousands and thousands of years, and meantime men will not feel its motion.

If you cannot *feel* that the thing you are travelling on is moving, there is only one way of finding out that it is moving, and that is by looking at things outside it and seeing what they seem to do. Clever men have been doing this for ages, and there seemed to be no doubt at all about what they saw. As we have already seen, when we look up at the

sky we find the Sun, for instance, seeming to travel once round the Earth every day.

But, as a boy in a train can sometimes make a mistake and think that the other train is moving when it is really *his* train that moves, so all the men who thought they saw the Sun moving across the sky were wrong. It was not the Sun that was moving, but the Earth. We still talk of the Sun rising and setting, and no doubt men will go on doing so for ages, but the Sun does not rise and set. It is simply the Earth that is spinning round like a top. If you have got a globe, a little round model of the world, you can easily learn from it something about the first kind of movement of the Earth.

THE TURNING OF THE EARTH THROUGH THE SUNLIGHT INTO SHADOW

There are at least three different movements of the Earth, and we must look at them all. The one we shall begin with explains why the Sun seems to rise every morning in the east and to set every evening in the west. Take your little globe—if you have not a globe an indiarubber ball or an orange will do—and hold it in your hand opposite a lighted candle in a room where everything else is dark. The side of the ball next to the candle will be lit up, and the side away from the candle will be dark. Put a spot of ink on the ball and call it your house, and hold the ball so that the spot is opposite the candle. Now turn the ball slowly round, and the spot will travel round until at last it loses the light of the candle. Then, as you go on turning, the spot will become lit up again.

The candle stands for the Sun, and when the spot is just opposite the candle, that is *midday*. Then, as the ball goes on turning, the spot loses the candle-light ; that is to say, the Sun sets, and it is night. Then the spot turns to the side where the ball is lit up, and if you were on that spot you would say the Sun had risen once more.

WHAT WOULD HAPPEN IF THE EARTH WERE TO STOP MOVING

Imagine the ball to be the Earth and the spot your house, and you will begin to understand how day and night occur. It is night because your side of the Earth passes out of the sunlight ; it is day because it comes into the sunlight again.

Think what it would be like if it were always day, or if it were always night. If the Earth were not for ever spinning round and round like a top, and if it were quite still, one half of it would always be in daylight, while the other would have an endless night. So long as you hold your ball or globe or orange still, one half of it must be next the candle, and the other half away from it.

What do you think would happen to us all if the Earth were to stop moving round and round, and if it slowed down quietly like a top so as not to jerk us all off? Suppose it stopped with our part facing the Sun, we should say : "The Sun is standing still in the heavens." The lamplighters would do their work at the ordinary time. People would say : "It is a very bright evening," and then they would say : "Whatever has happened?" There would be no night at all ; it would go on being day. Do you think that all the people from the other side of the world, where it was night all the time, would jump into their ships and come over to our side so as to see the the Sun again? Probably they would, but before long we should all be very glad to get on to the dark side of the Earth—for a time, at any rate. The best thing for us is that the Earth should go on spinning as it spins now, and that we should have the day to be awake in and the night for sleep.

THE BEES THAT WERE DECEIVED AND DIED FROM OVERWORK

There is a story of some bees that worked hard all day, and went to rest when someone lit a brilliant electric light and brought a sham day back to them, The bees started work again until the light was put out, and then, soon after, the sun rose, and they started again. At the end of that day they were all worn out, and died from overwork. But the natural and proper thing for bees—and for men, too, who live on a great spinning top—is to be awake when the part of the top they are on is facing the Sun, and to sleep when it is turned the other way.

But the spinning of the Earth, which gives us night and day, is by no means the Earth's only movement. You will have noticed, when spinning a top, that sometimes it stands in one place and spins there, but sometimes it moves along the table. When this happens the top is moving in *two ways at once*.

It is spinning on itself, so to speak, and also being moved as a whole from one place to another. The Earth is like the

ROUND AND ROUND THE SEASONS COME

SPRING

SUMMER

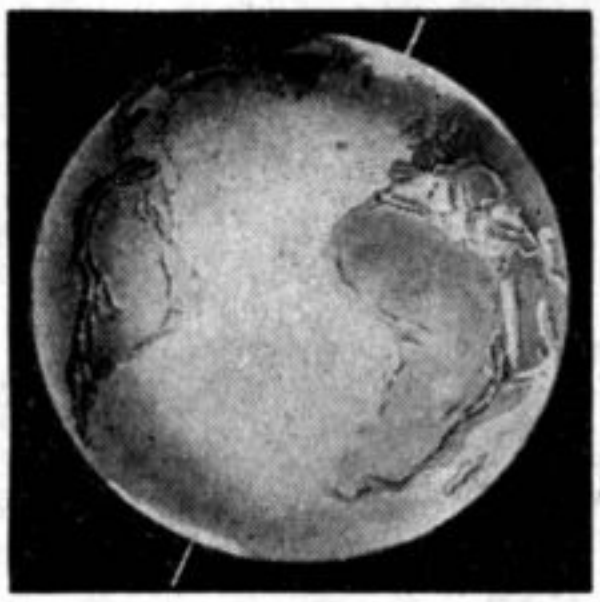
AUTUMN

WINTER

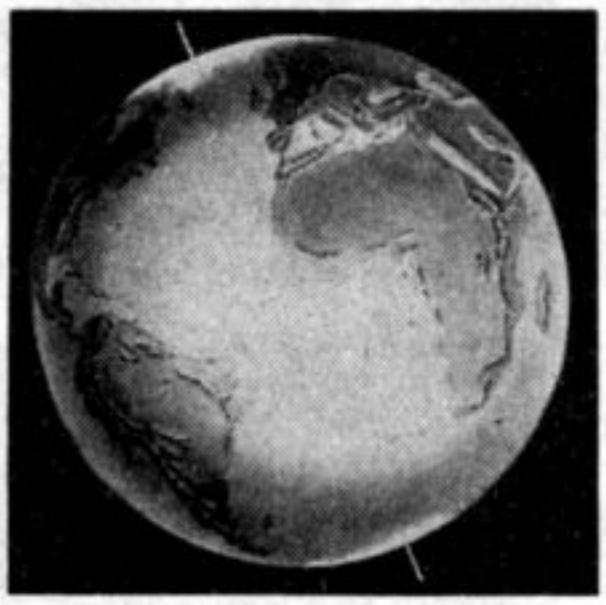
top. All the time the Earth is spinning on itself it is also moving as a whole, as the top does when it moves along the table. We do not feel this, but it is the most important movement of the Earth, even though its results are not so startling as the day and night which the spinning movement gives us.

There is no need now to ask "What holds the Earth up?" We know that the Earth is not supported by anything, but flies through space without stopping from one year's end to another.

A year, you know, is a real thing—not like a week. We may think a week is a real thing because Sunday always comes back every seven days, and so do the other days. But we might just as well miss out Wednesday, Thursday, Friday, and Saturday, and make the week three days. Long ago men agreed to call seven days a week, and we do so still, but a week is an *artificial* thing; a day is a *natural* thing, and so is a year. We say a week is an artificial thing because nothing in Nature makes it; but a day is a natural thing because a great fact in Nature makes it, that fact being the spinning of the Earth. A year is also a natural thing, because it is made by this second kind of movement of the Earth, which is like the movement of the top *along* the table.



HOW THE EARTH IS TILTED TODAY



HOW THE EARTH WILL BE TILTED IN 12,000 YEARS

Let us think of a spinning ball now, instead of a spinning top. We know very well that a ball can spin as it goes along, because we can set it spinning on a table, and as it spins it will also run in one direction or another. What direction does the Earth move in, then? We have already seen that day and night, which never fail us, are due to its spinning. Now, on the whole, one night is just about as dark as another, and one day as bright as another—that is, if we think of all the days and nights we can remember.

This means that the Earth does not get much nearer to the Sun or go much farther from it. It stays at about the same distance, yet it always goes moving onwards, onwards, onwards. That means that it *must go round the Sun*. If you tied a string from your ball to your candlestick you could make the ball fly round the candle, only it would not be so easy to make the ball spin as it flew.

If you could make the ball spin, and if you could make it spin on itself about 365 times while it was going right round the candle once, that would be what the Earth is doing. The Earth is always flying round the Sun, and if you made a mark at some point, and then waited until the Earth came back to that point after going round the Sun once, the time the Earth took in its journey would be a year, and during that journey round the Sun the Earth would have spun round on itself 365 times. Really, it is about 365 and a quarter times, and it is so that we may not forget that quarter that every four years we have what we call leap year, making the year 366 days long by giving February 29 days instead of 28.

In its course round the Sun, however, the Earth does not move in a perfect circle, but in a circle very slightly oval, so that it is sometimes a little nearer the Sun and sometimes a little farther away. Nor does it always move at exactly the same speed, but quickens as it nears the Sun. This is necessary, for if the Earth moved no more quickly when near the Sun than when farther away, it would be drawn into the Sun; and if it moved as quickly when farther away as when near it would fly away from the Sun altogether.

We have mentioned two of the three great motions of the Earth—its spinning on its own axis and its revolution round the Sun—and we now come to its third motion, which may be described as a wobble—such a wobble as a top makes.

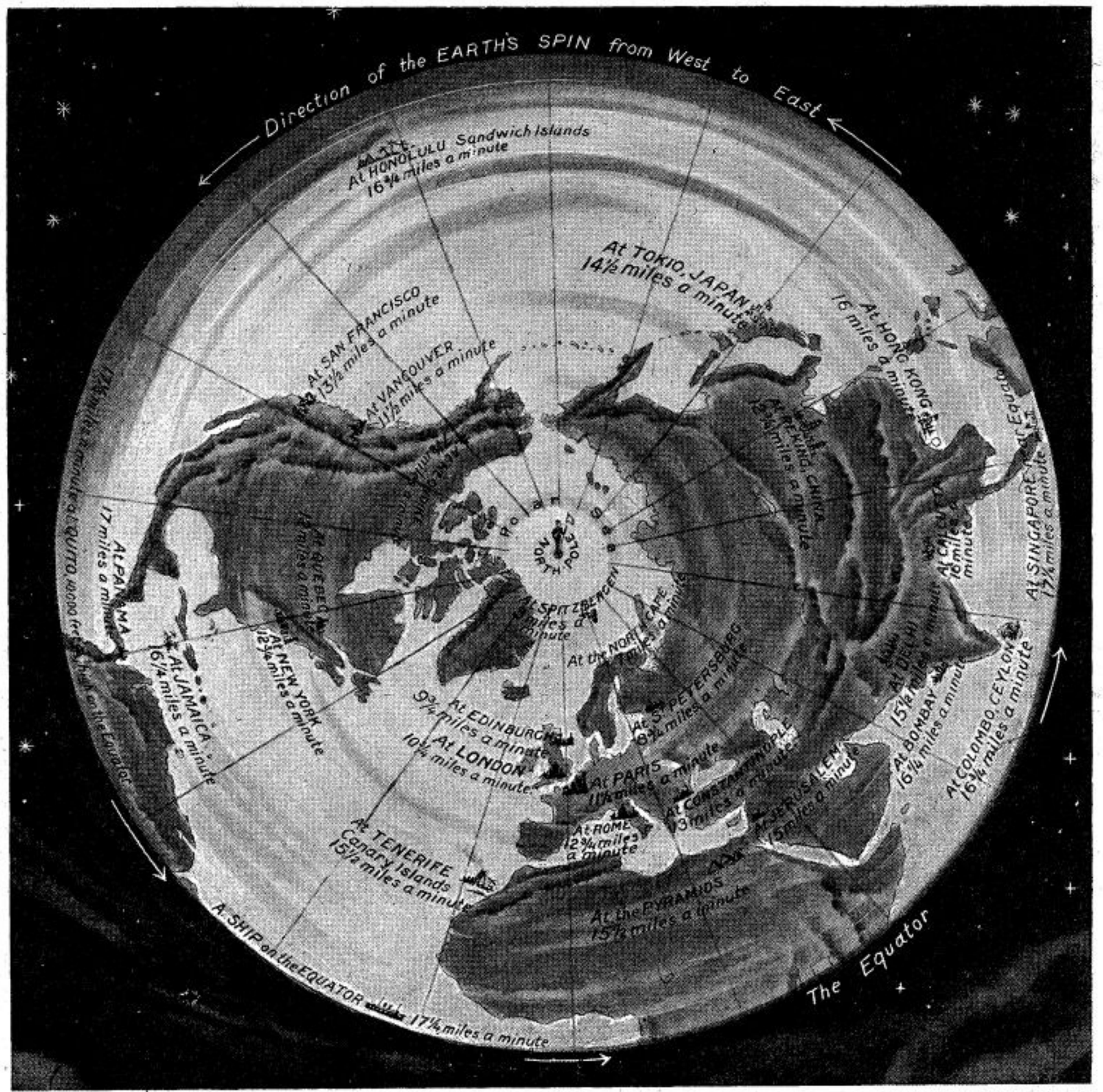
If you have a globe, you must have noticed that it is not set squarely in its frame. The North Pole is not at the very top and the South Pole at the bottom, but the globe is tilted. This tilting of the Earth as it goes round the Sun is very important indeed, for it is responsible for the seasons. It means that the northern

half of the Earth will get the Sun's rays pouring very directly down upon it during one part of the year, which we call summer, but not so directly during the other part of the year, the winter.

That is why summer is hot and winter cold. You might perhaps think that when the Earth was nearer the Sun this would make summer; but, as a matter of fact, the Earth is nearer the Sun during our winter. Our winter, also, is summer for the Australians, who live on the opposite side of the world, and when we have summer they have winter. So the distance of the Earth from the Sun has nothing to do with the seasons, and they are due, as we have said, entirely to the fact that the Earth is tilted.

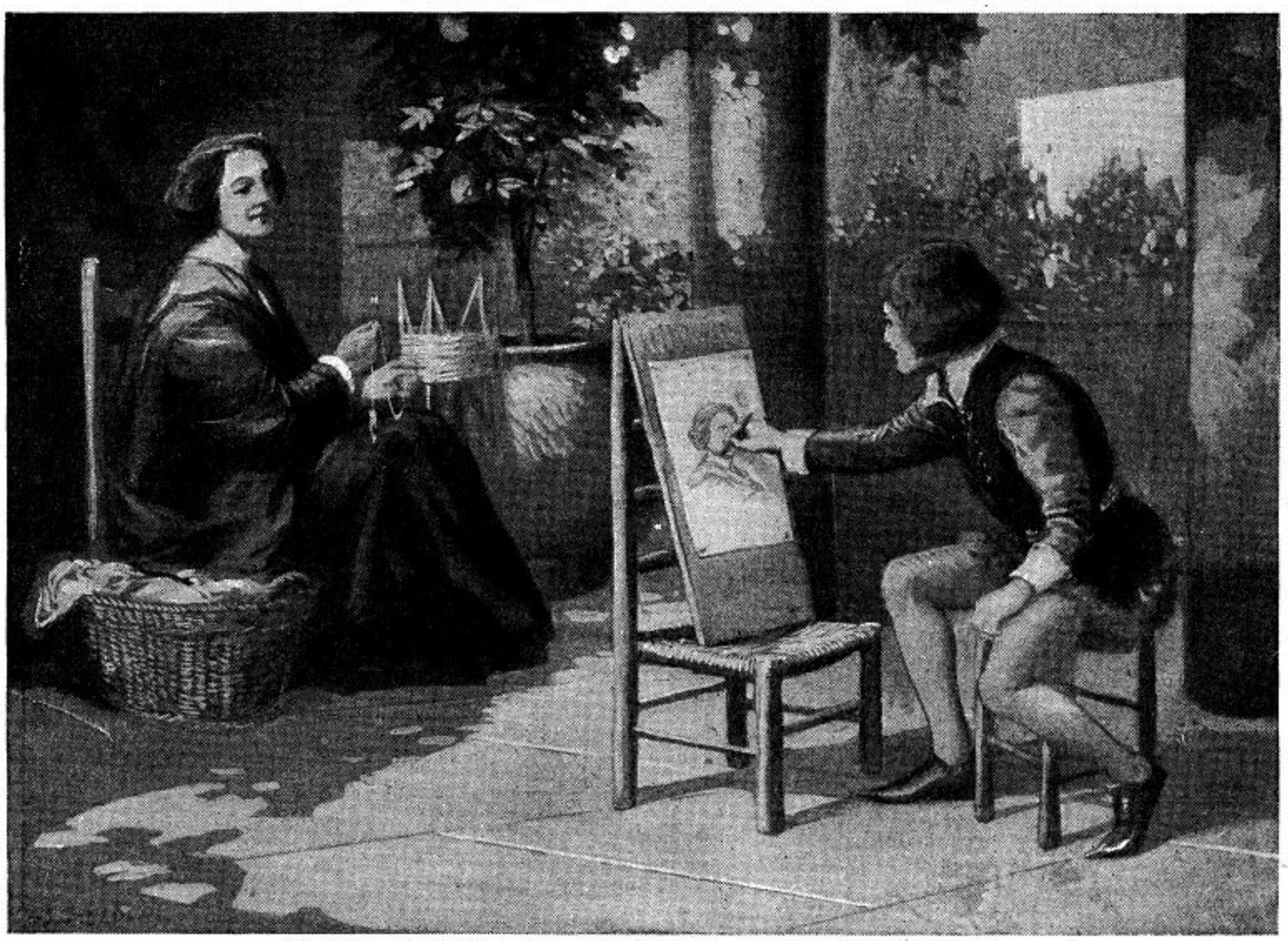
Now the wobbling we have mentioned has to do with this tilting of the Earth's axis. The Earth is not always tilted just the same amount, but for thousands of years it becomes rather more tilted than it was, and then for thousands of years rather less tilted. To be sure, this wobbling of the Earth is a very slow affair. Indeed, one wobble takes about twenty thousand years. Now, if we remember that the seasons are due to the tilting of the Earth, we may understand how it is that at one part of the wobble the Earth may be so much tilted that the winter, for instance, in its northern half will be very long and cold. This helps us to explain the times past when, as we know, all the northern part of the Earth was covered with ice.

These, then, are the three chief motions of the Earth—its spin, its revolution round the Sun, and its wobbling tilt.

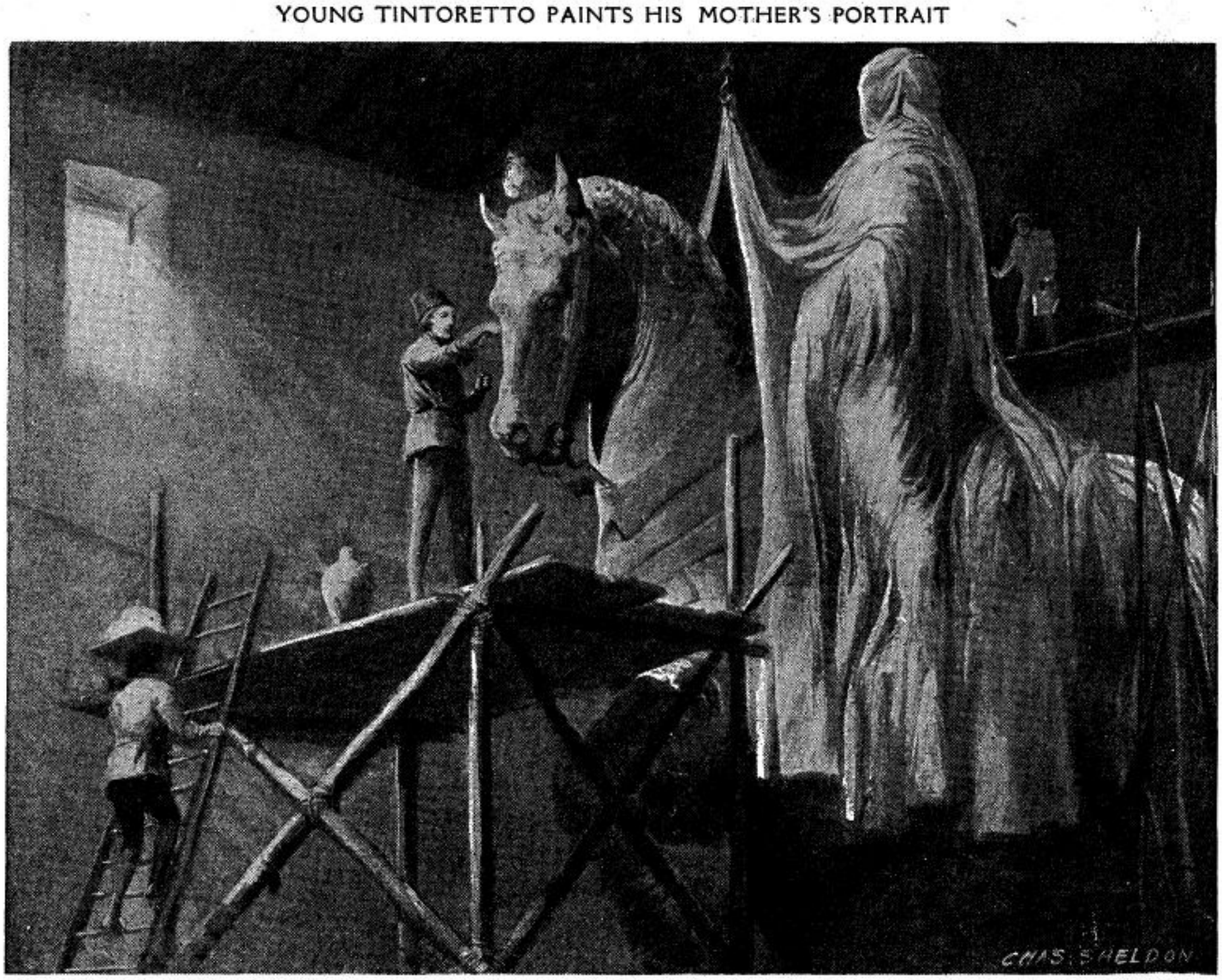


THE WORLD FOR EVER MOVING ROUND AND ROUND—A PICTURE-MAP SHOWING THE RATE AT WHICH VARIOUS PARTS OF IT TRAVEL ROUND ITS AXIS

TWO FAMOUS SONS OF VENICE



YOUNG TINTORETTO PAINTS HIS MOTHER'S PORTRAIT



ANDREA VERROCCHIO FASHIONS THE HEAD OF HIS FAMOUS HORSE FOR THE COLLEONI STATUE

Albert Dürer

Donatello

Tintoretto

Giovanni Bellini

Andrea Palladio

Giorgione

Verrocchio

Paul Veronese

THE FAMOUS MEN OF VENICE

VENICE is old, but age does not disfigure her. Our admiration and love for her increase. She is very beautiful in her old age, and very pathetic. All her glories belong to the past. Venice is slowly decaying.

She stands like some beautiful vision on the sands of the seashore, and men, as they see her image reflected in the gleaming waters of the lagoon, wonder if it be not some fairy fancy that they picture. Such cities as Venice seem to belong more to dreams and poetic visions than to this world of ours.

Hundreds of years ago, when barbarians overthrew the might of Rome, a small number of Roman descendants were driven before the conquering Goths and Lombards down to the coast of the Adriatic Sea. They hid in swamps and in little islands near the coast, and became fishermen and sailors.

Each island was controlled by its own tribune, appointed by the people. After two centuries, however, the people appointed one man a duke (or doge, as they called him) to rule over them all. No longer did they fear attack from the mainland. They constructed bridges to join the islands together, and canals were made along the channels where the water had previously flowed unchecked. They built a powerful fleet, and this fleet they sent, in 827, to Alexandria, where it is said to have recovered and carried back to Venice the body of St. Mark.

Venice became a crowded, wealthy, and important city. She sent out her soldiers and her ships with the Crusaders. She built up a great trade. She bought from the East and sold to the West ; she bought from the West and sold to the East ; and her own manufactures became famous.

While her citizens were prosperous they had ample means for making their city beautiful. Her richest residents could not build great castles, for there would not have been room for them in Venice ; so they built gorgeous palaces of marble. The Republic could not build huge forts, so they devoted their money to erect splendid halls, council chambers, and palaces.

They had very little space on which to build, so they made a small city unequalled in beauty.

Her widespread trade brought her into relationship with all the civilised world, and she gleaned knowledge from them all. The fall of the Greek Empire sent the learned Greeks to Venice for refuge. They taught the Venetians all that they knew, gave them the treasures of the old writers, and so implanted a love of learning in them

that it is to the Venetians we owe some of our finest literature.

Great works which would have perished for ever were translated by them, and preserved for all the world. The Arabs, then among the masters of learning in the world, taught them how to make gunpowder and how to make glass, and taught them also the first principles of decorative art. East and West, wherever they went, the Venetians were always learning.

Their early building combined many styles, the elaborate fancy of the East with the sterner simplicity of northern Europe; but all was so beautifully blended that there was nothing in the world quite like it.

It is not easy to point to many notable architectural features of Venice and say that they are the work of such and such a man. Their building took too long, and engaged too many men in successive generations for that. Thus it was with the famous Palace of the Doges, and the cathedral and Campanile of St. Mark. The cathedral and palace still stand, and the Campanile stood until 1902, when, through gradual decay and neglect, the lovely tower crashed suddenly one morning to the ground. A terrible disaster to art, it was, but happily it came about with little damage to life or property. The Venetians have since rebuilt the tower on the old foundations.

THE MAN WHO BUILT THE SPLENDID LIBRARY OF VENICE

Among the famous architects of Venice come the names of Giovanni Giocondo and Michele Sanmichele, both of the sixteenth century; but a greater architect than either arose in the person of Jacopo Sansovino, who was born at Florence in 1477, and lived in Venice from 1527 up to his death in 1570. Several churches stand to his credit in Venice, but the work which immortalised him was the building of the famous library of San Marco, and the Mint which adjoins it. He built them at the same time, joining wall against wall, to form the most striking contrast. The library, now called the Royal Palace, is one of the sights of the city—a building of two storeys, each supported by a series of arches of the greatest beauty.

Next followed a man to whom English architecture owes much. This was Andrea Palladio, who was born at Vicenza in 1518, and died there when sixty-two. He gave practically all his life to beautifying Venice. He built splendid churches and other edifices, but not palaces. He loved space for his work, and to rear buildings distinguished by dignity and simplicity.

Much excellent sculptural work was done by the Lombardo family—the Lombardi, as they are called.

THE SOLDIER WHO GAVE HIS FORTUNE TO BE REMEMBERED FOR ALL TIME

In their workshops many other sculptors received their training, among them being Alessandro Leopardi, whose name is familiar to every visitor to Venice. Born in the latter half of the fifteenth century, he died about 1545, but his fame remains fresh. Two things make him always notable—the majestic flagstaffs which rise in front of St. Mark's, and the work which he did in connection with the statue of Colleoni.

Colleoni's deeds of war are of no account today; he is of no more importance to the world than if he had never lived, but he is of interest as having called forth a supreme work of art. He gained great wealth from the wars, and at his death he left all his money and horses and arms to the State, on the condition that they should raise a statue to his memory.

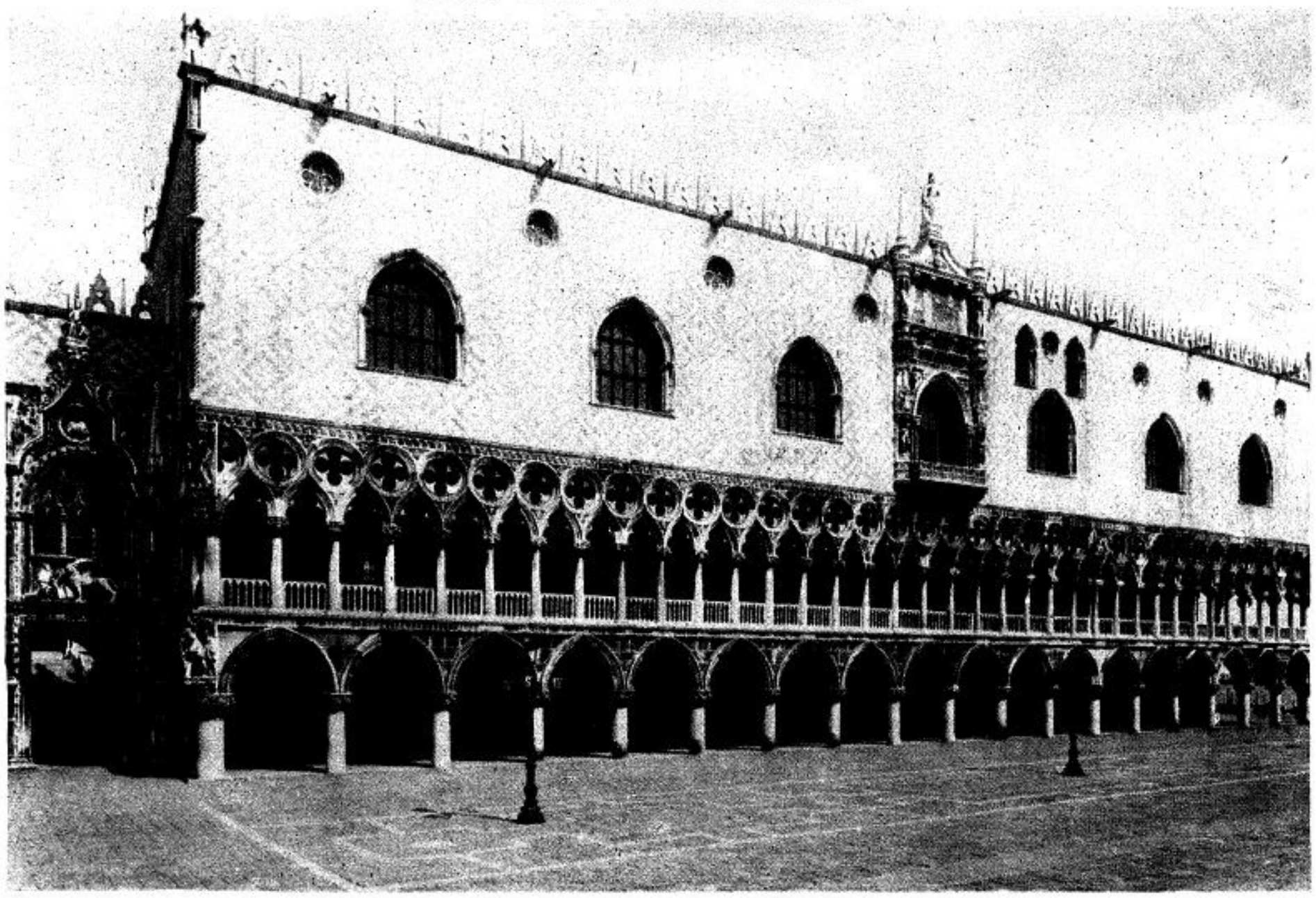
The Venetians faithfully carried out their part of the bargain. Although Venetian sculpture was making progress, they could not trust one of their own citizens to do this work. They sent to Florence for Andrea del Verrocchio, who was famous as painter, sculptor, and goldsmith, and memorable to us as a teacher of Leonardo da Vinci. He was born in 1435, and was 44 when sent for to make the Colleoni statue. He—Verrocchio—had only nine years to live, and we might fancy that he realised that this was to be the last and greatest work of his life.

THE SCULPTOR WHO COULD AFFORD TO LAUGH AT VENICE

Verrocchio went to Venice to make the statue there, and the story is told that he had just modelled his horse when he heard that the Government of Venice meant to ask a scholar of Donatello to set the rider on the horse's back. Verrocchio was indignant. He broke his horse's head to bits and went home to Florence, and there followed him a decree forbidding him ever to set foot in Venice again under penalty of death. But artists can always laugh at Governments; they have a power that politicians know not of. Verrocchio

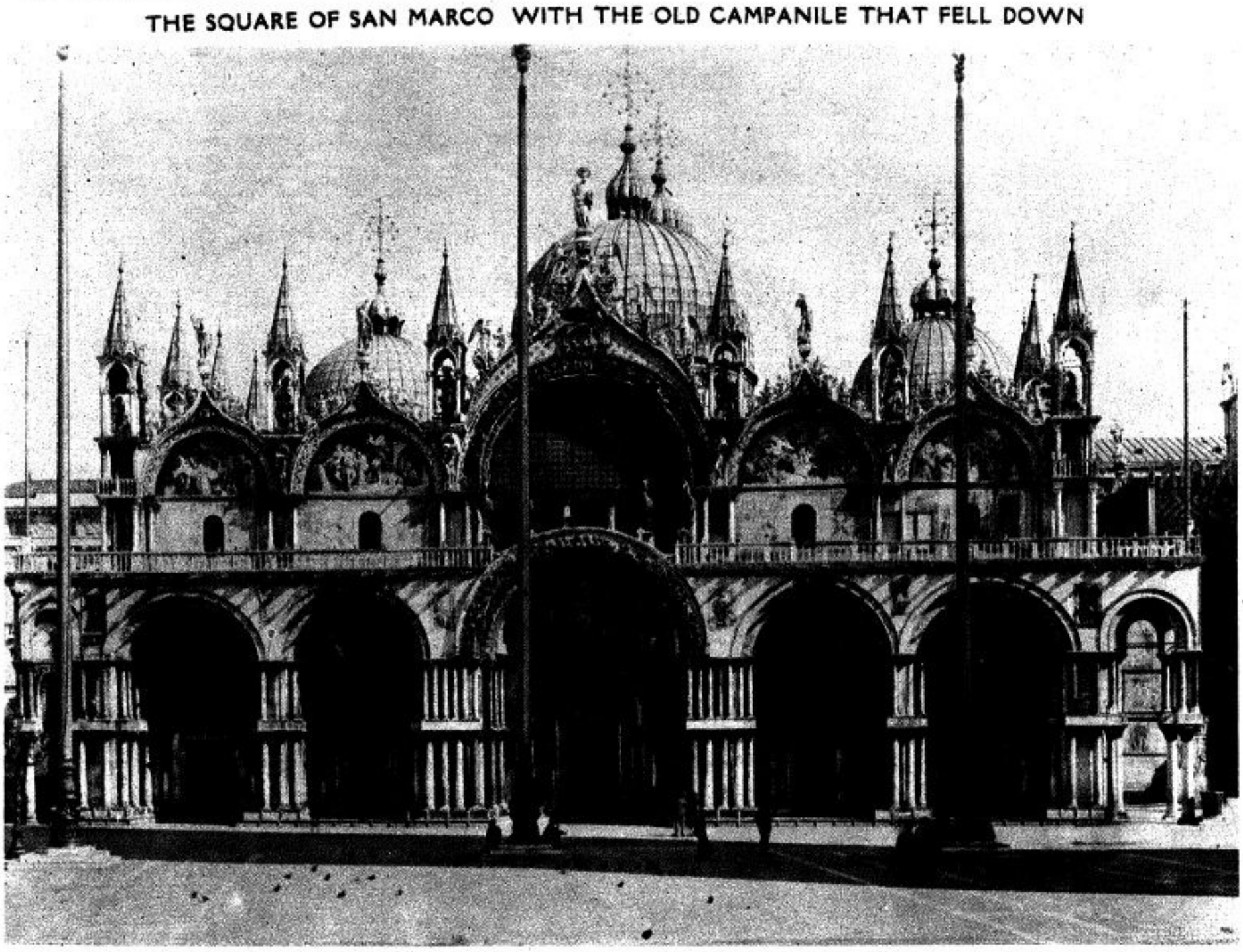
VENICE IN ALL HER GLORY

VENICE RISING FROM THE WATERS

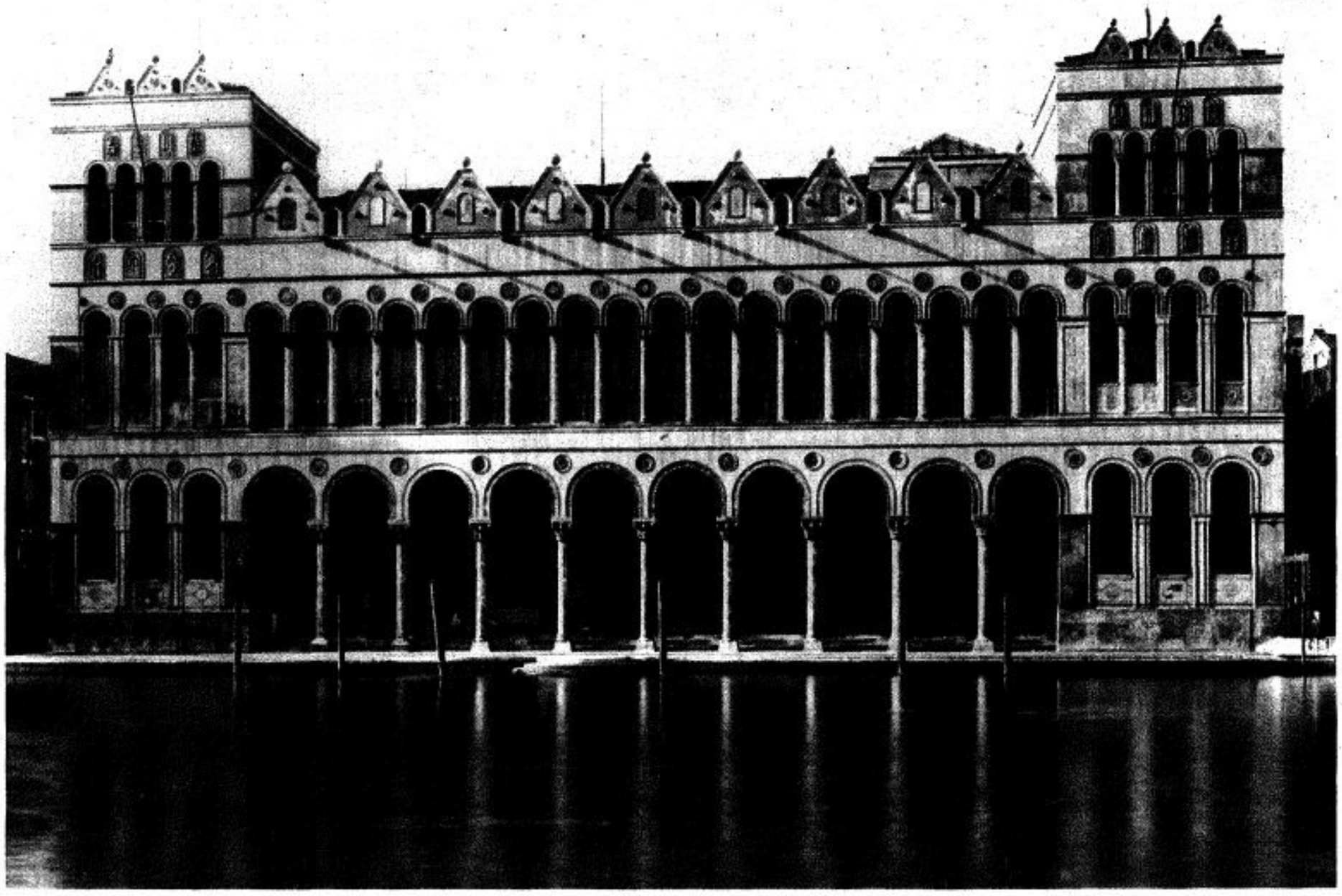


THE DUCAL PALACE THAT HAS STOOD FOR CENTURIES

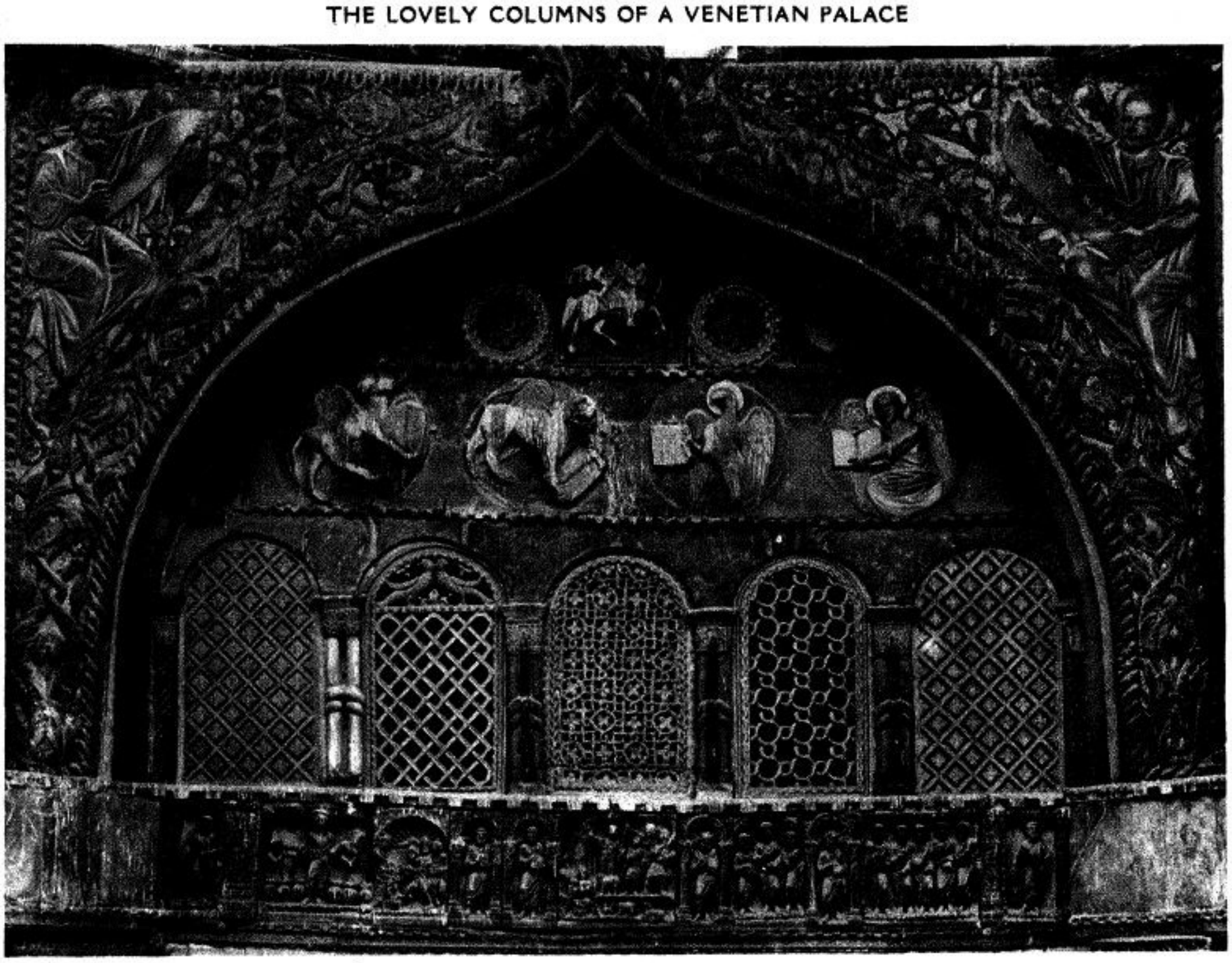
THE SQUARE OF SAN MARCO WITH THE OLD CAMPANILE THAT FELL DOWN



SAN MARCO, THE MARVELLOUS DOMED CATHEDRAL OF VENICE

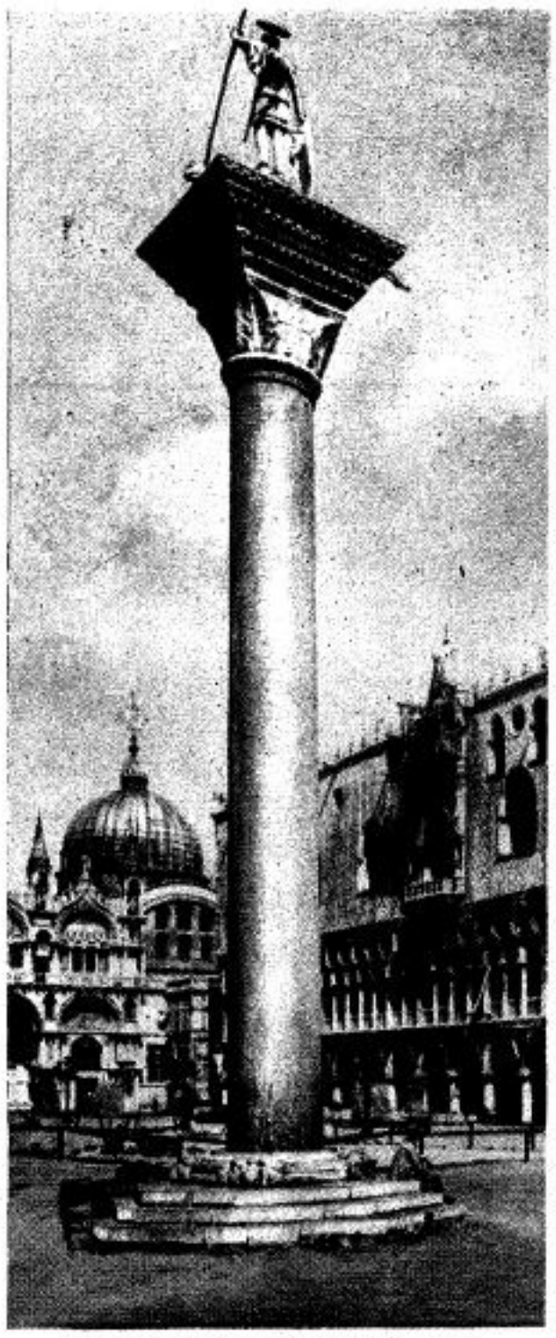


THE LOVELY COLUMNS OF A VENETIAN PALACE



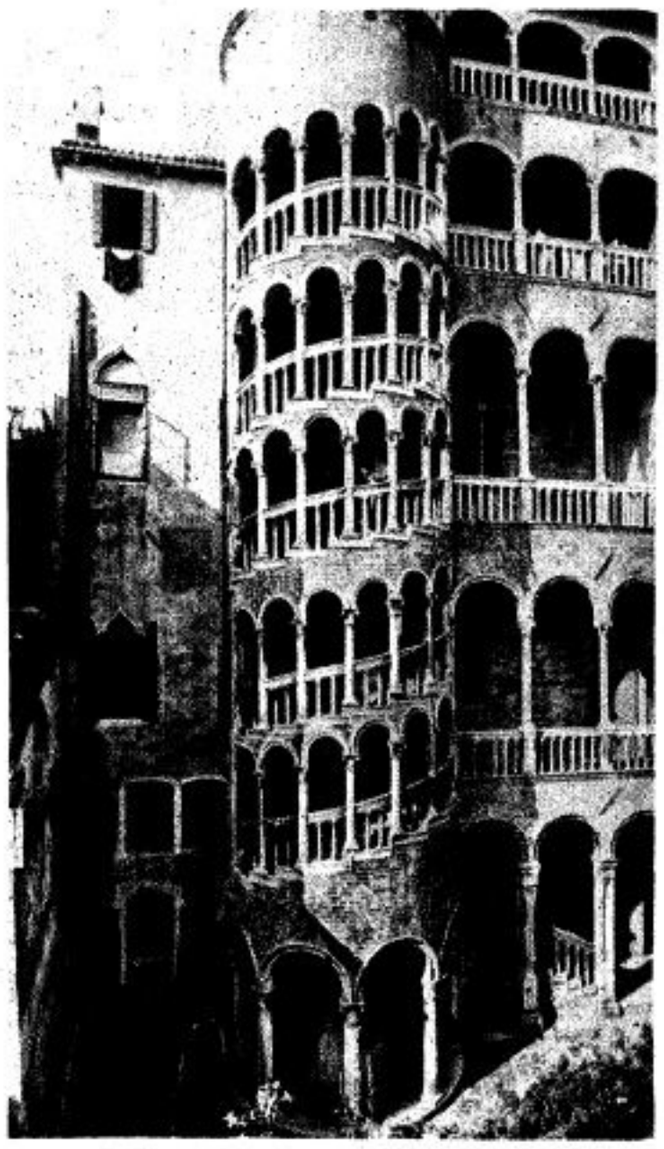
A RARE PIECE OF THE TWELTH CENTURY ABOVE THE DOORS OF SAN MARCO

A SQUARE IN VENICE



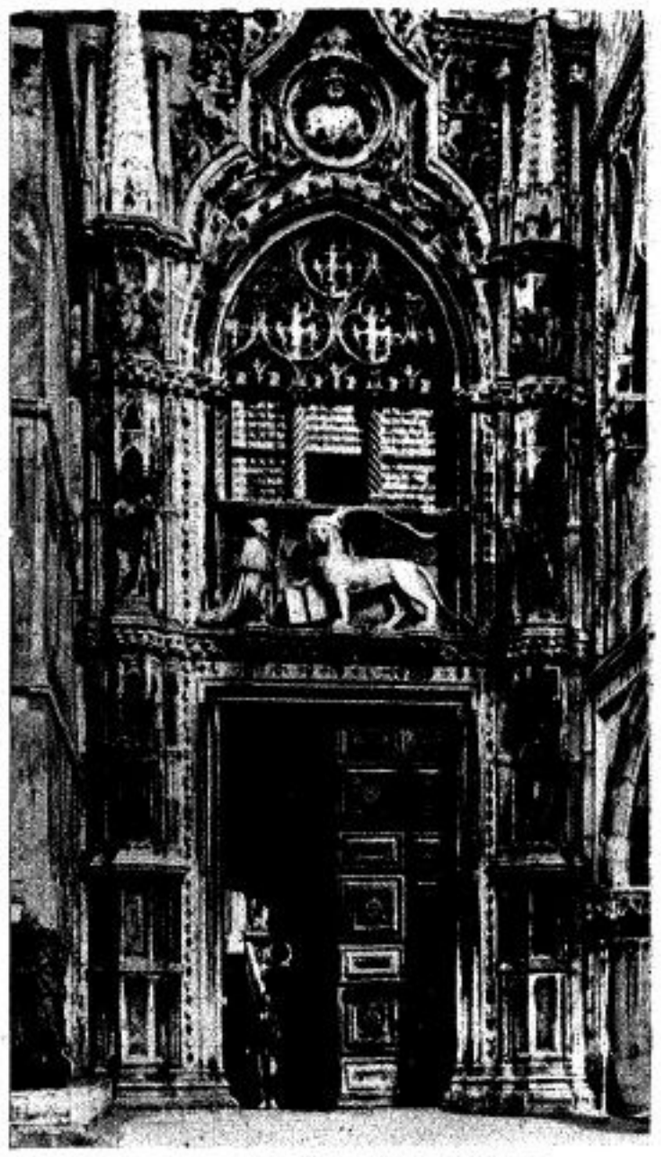
THE OLD COLUMN OF ST. MARK

THE COLLEONI MONUMENT



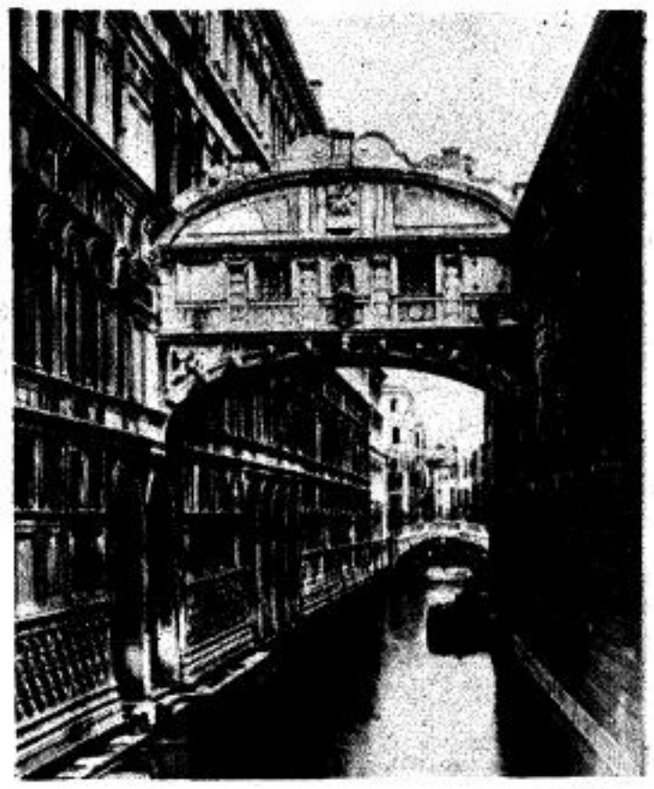
A STAIRWAY IN THE MINELLI PALACE

A LOVELY FIGURE IN A VENICE CHURCH



DOORWAY OF THE DUCAL PALACE

ONE OF THE BEAUTIFUL DOOR WAYS OF SAN MARCO



THE BRIDGE OF SIGHS BETWEEN PALACE AND PRISON

smiled at the decree of the proud Republic, and wrote back that he would never run that risk, as if his head were once cut off the Government of Venice could never put it on again, while he could at any time replace his horse's head. The Government of Venice felt that this was true. They cancelled their decree, begged Verrocchio to return, doubled his fee, and promised to leave him alone.

THE MOST SOLDIERLY FIGURE ON THE EARTH, BUT A NOBODY

He came back to Venice, and began his work again; but he had only begun to restore his broken model when the penalty of death was carried out indeed. Not the Republic of Venice, but a Power that neither men nor Governments can contradict carried the artist to his grave; a short illness, and his life was done.

He left behind him an appeal that one of his pupils should be employed to complete the work, but Venice chose Alessandro Leopardi, who had fallen into evil ways and some years before had been driven from the city as a forger and criminal. In their need they recalled him, and told him to make the casting. He atoned for his sin by the way in which he executed the task. He produced a splendid work from Verrocchio's model.

The statue is still without comparison. Horse and man seem alive. Mr. Ruskin thought it one of the noblest monuments ever set up on the face of the earth. Colleoni rides with defiant features, proud in his strength as a man, fierce and disdainful in his skill as a general. The horse moves heavily, but with great strength, as upon some dreadful battlefield. Leopardi was not satisfied with the fame which the pedestal gave him, but wrote his name upon the girth of the horse, as though the whole design were his. But nothing can rob Verrocchio of the honour of modelling one of the greatest masterpieces in the world.

THE FAMOUS FAMILY THAT STARTED PAINTING IN VENICE

Yet, after all, the great splendour and wonder of Venice belong to her paintings. There never was another place where such a notorious kingdom of art grew up. Venice is as supreme in painting as for the beauty of her situation and buildings. For a long time she had painters of no special merit, and then the Bellini family arose. With them came new light. The glory of Venetian art dawned with them. They began to paint finely in distemper before ever the art of oil-painting had been heard of in Venice.

The improvement began with Jacopo Bellini, who was born probably about 1400, and died about 1464. Jacopo never became a great artist himself. His work was an improvement upon anything ever done before in Venice, but his chief credit is that he was the father of two notable sons, who carried out his own splendid ideas.

They worked together with him, and all the young artists of Venice who desired to become great in their art flocked to their studio to become pupils. Giorgione and Titian were of the number. Gentile Bellini painted scenes from the life of Venice; Giovanni Bellini painted religious subjects as Venice had never before seen them painted. Gentile painted portraits, and gained such fame that he was sent for by the Sultan of Turkey to paint his portrait.

THE BELLINIS WELCOME THE NEW MANNER OF OIL PAINTING

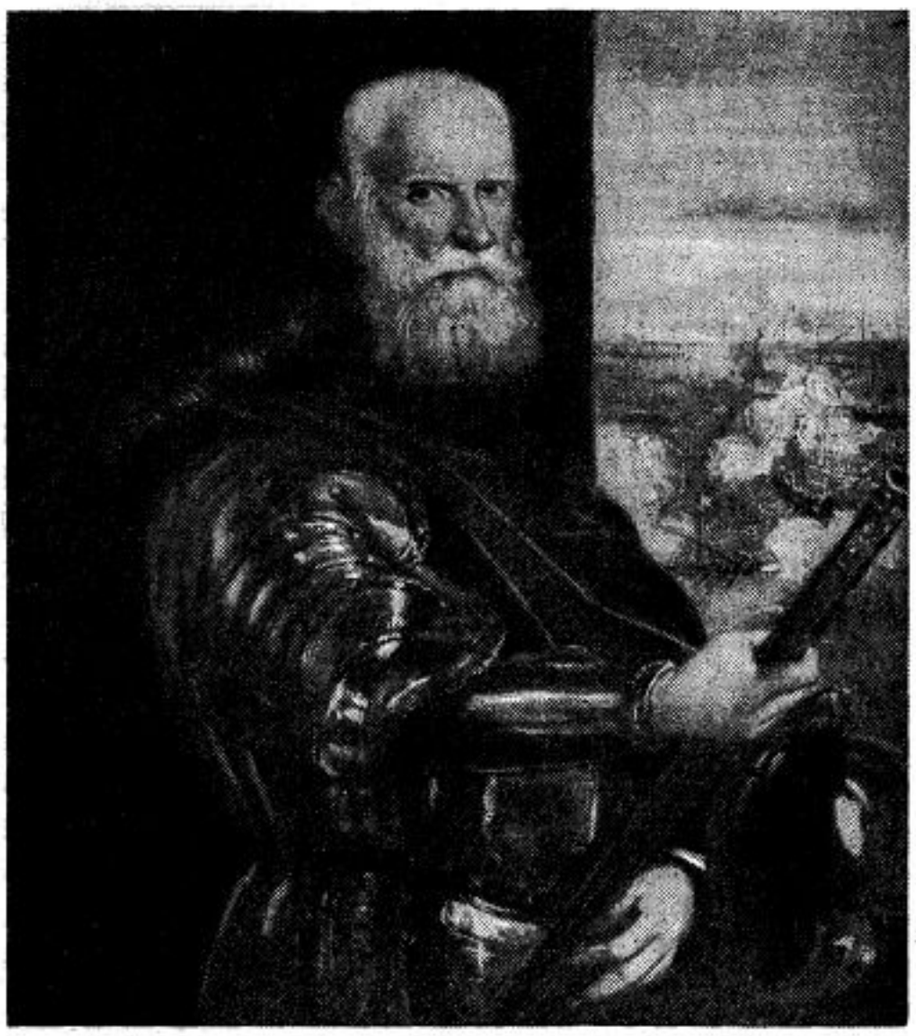
Gentile went and painted a famous picture of the cruel man who then ruled over Turkey. This wretch one day wished to show that Bellini had not correctly painted the head of John the Baptist after death, so he drew his sword and cut off the head of a slave standing near. So horrified was the artist that he never rested until he was back in Venice.

But a great change had now come over the art of Venice. An artist named Antonello, of Messina, appeared in the city, bringing with him a new art. He had learned from Hubert and Jan van Eyck, the great Flemish artists, their secret of painting with colours mixed with oils. Let us look for a moment at a scene painted for the stage of a theatre; it is done in distemper, the medium in which the artists of Venice had been working. Then let us remember one of our glorious oil-paintings at the National Gallery, which is the style of work that Antonello introduced. It set all Venice wondering.

The story runs that Giovanni Bellini went in disguise to Antonello to have his portrait painted, solely that he might learn for himself the great secret. Whatever the truth of this story, we know that the grand secret was soon mastered in Venice, and that the Bellinis were the first to help make it famous by their work.

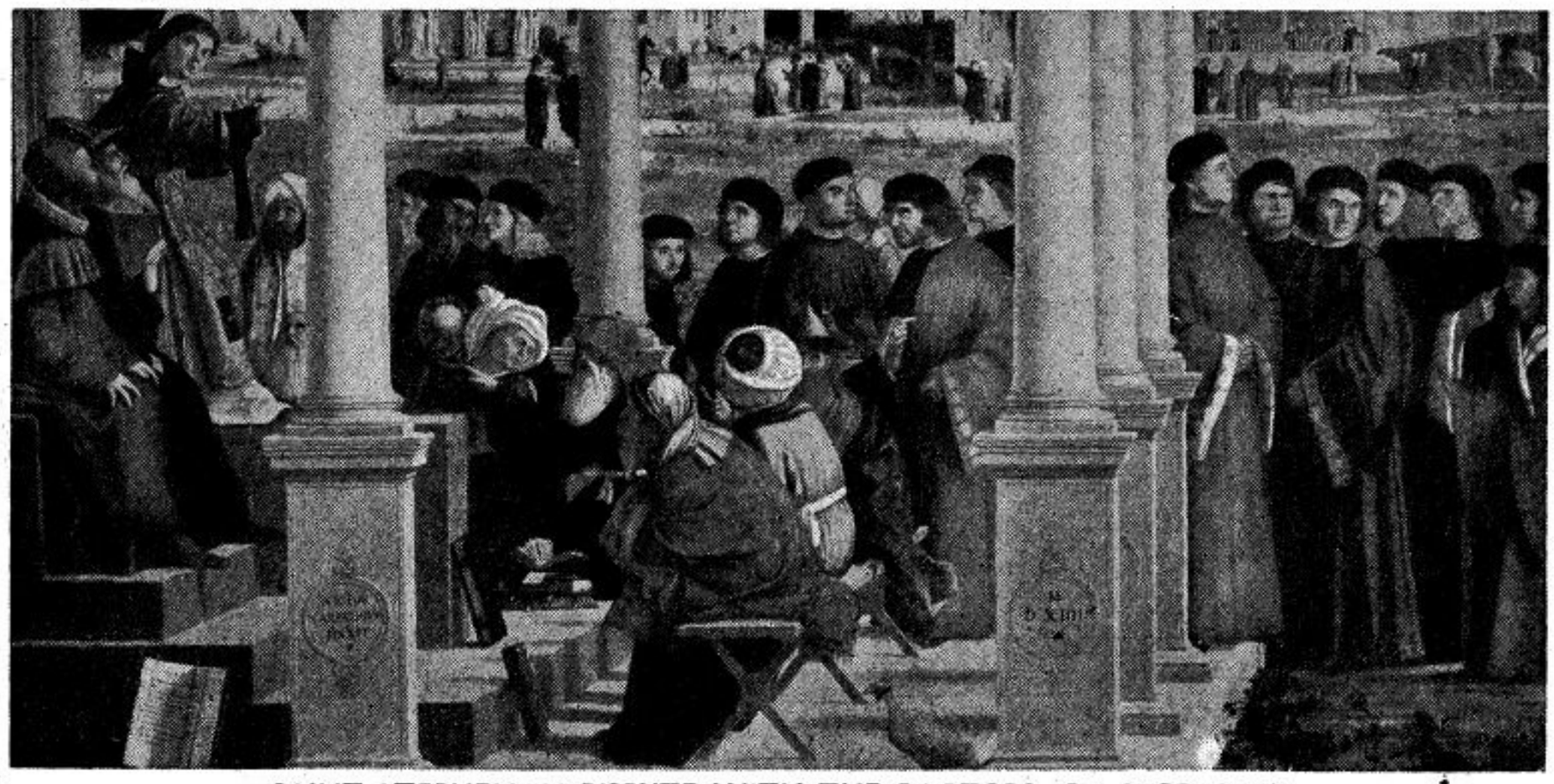
PICTURES BY THE FAMOUS MEN WHO

THE MARRIAGE OF CANA—BY PAUL VERONESE



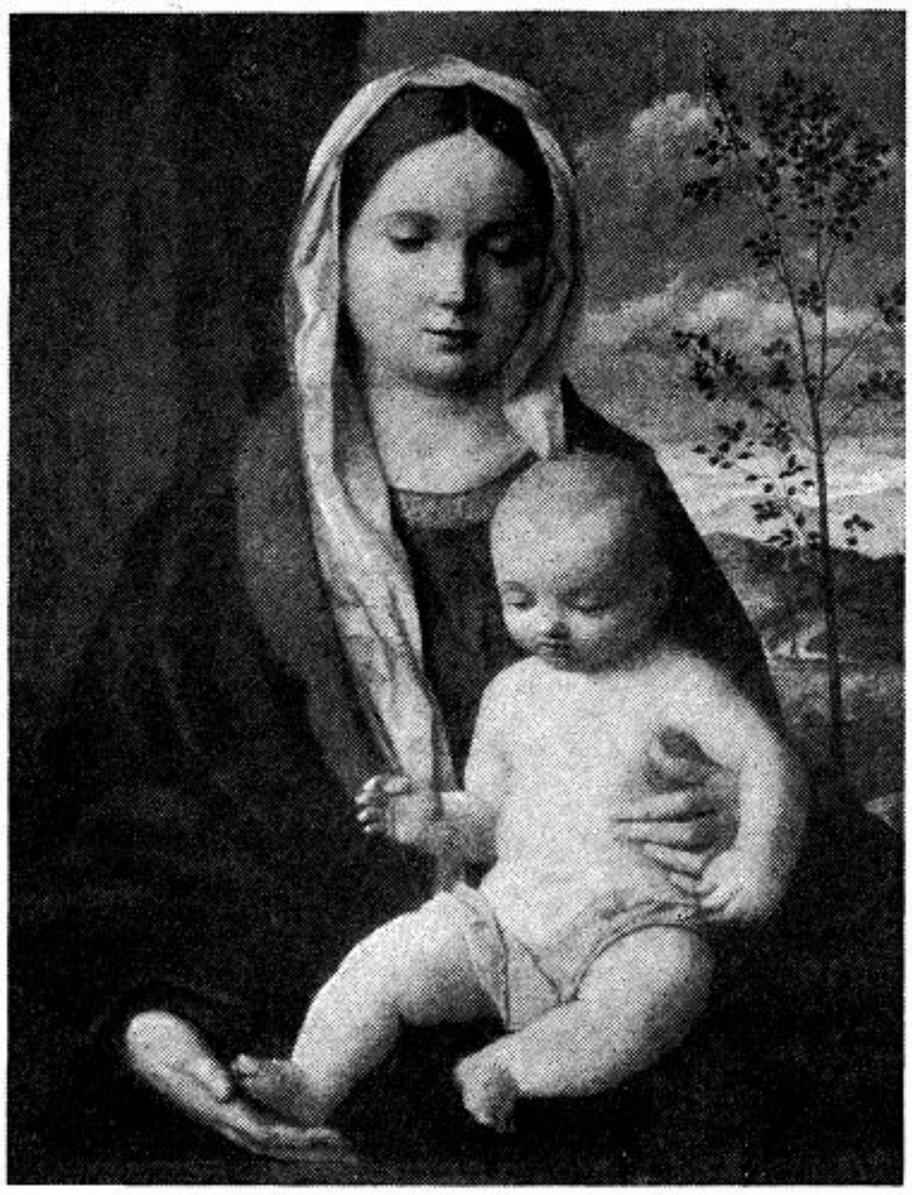
ADMIRAL VENIERO—BY TINTORETTO

INDUSTRY—BY PAUL VERONESE

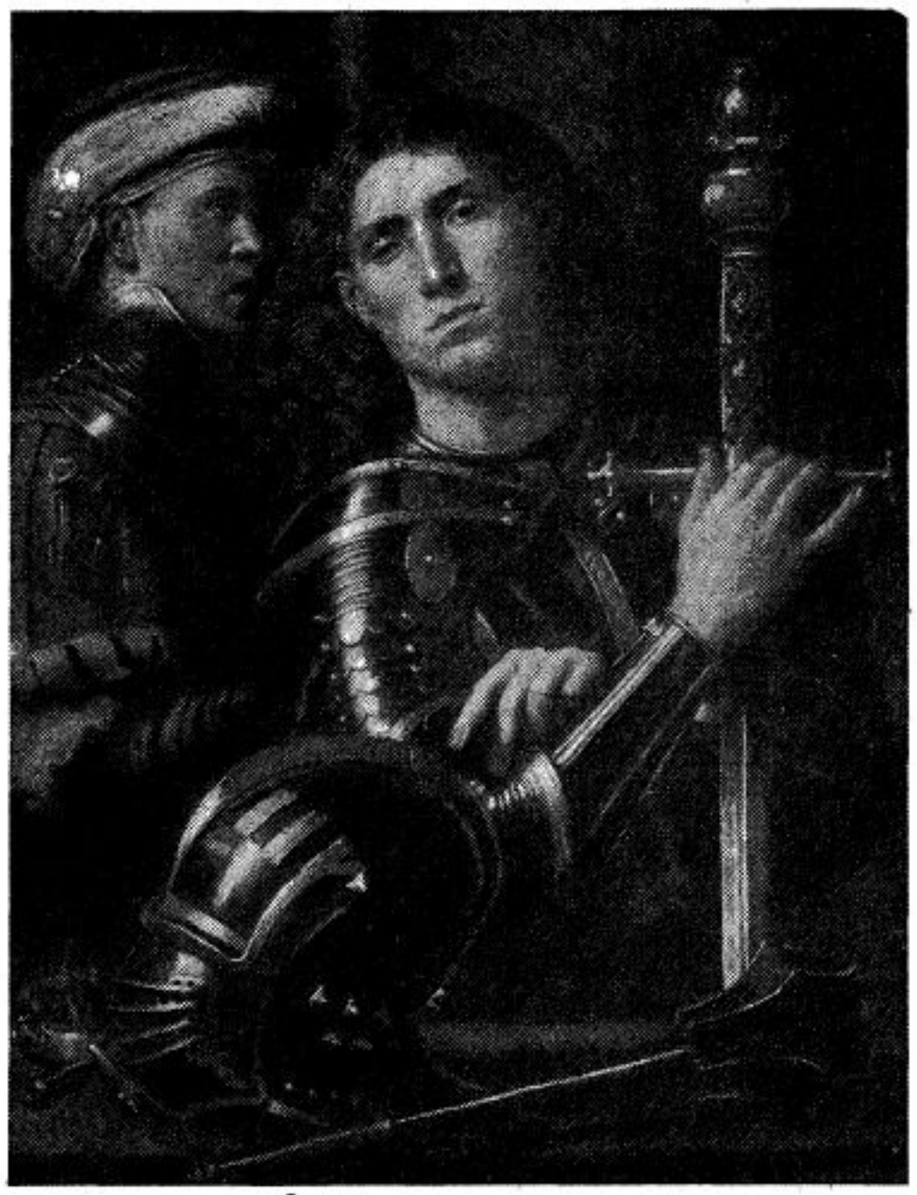


SAINT STEPHEN IN DISPUTE WITH THE DOCTORS—BY CARPACCIO

ADORNED THE WALLS OF VENICE

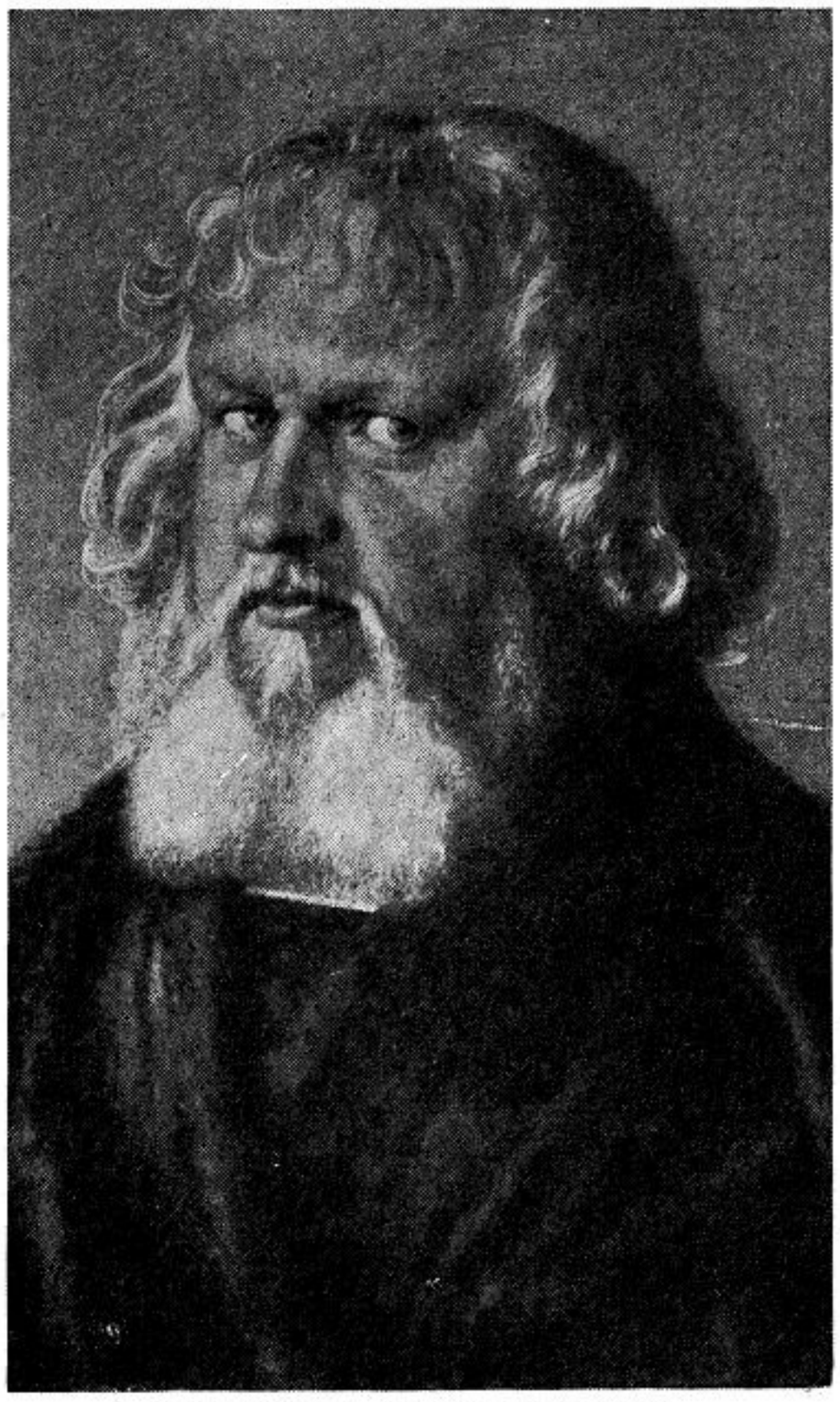


VIRGIN AND CHILD, BY GIOVANNI BELLINI



PORTRAIT OF A GENERAL, BY GIORGIONE

PORTRAIT OF A WOMAN, BY TINTORETTO



A PORTRAIT BY ALBERT DÜRER

Venice was now glorified by many brilliant works of the brothers.

But the Venetian authorities feared that death would come too soon and carry off Giovanni Bellini before his work for them was done. Though they paid poorly for the work, they loved his art, and were determined to get as much out of him as possible. They therefore decreed that he should work every day in one of the great State apartments he was decorating, and should have assistants.

THE MIGHTY GENIUS WHO LEARNED PAINTING AS A WORKMAN

These young men had only four or five ducats a month as payment, and the great Titian was one of the workmen. The document stating the terms of his engagement refers to him with as little ceremony as if he were a poor man called in to whitewash a ceiling. He became one of the greatest painters of all time, and his story is told elsewhere. The mighty genius of Titian could never have developed in the way that it did had not Jacopo Bellini and his two illustrious sons given a new turn to the world of art.

Gentile Bellini died in 1507, nine years before his brother Giovanni. Both of them had the happiness to meet Albert Dürer, Germany's greatest painter. Born at Nuremberg in 1471, Dürer had a hard struggle for education. His father was a poor goldsmith with a family of eighteen children, and Albert had for a time to support his aged mother and a brother as well as his own family. He worked like a slave to master the elements of painting. His father, bitterly disappointed that the lad had wasted his time by years of study of the goldsmith's art, for which he had no love, at last allowed him to adopt painting as his profession.

THE GREAT BELLINI SITS AT A YOUNG MAN'S FEET

There was little money for Albert in Nuremberg, but elsewhere others made money by copying his designs and selling the copies as his work. These pirated copies reached even Venice, and it was to prevent this dishonest trading in his productions that Albert, in 1505, went to Venice. His paintings astonished the Venetians.

The younger men were jealous. Not so the Bellinis. Giovanni went to Dürer as humbly as if he had been an apprentice, and asked to see the German painter's work. He could hardly believe that he had painted some of the things said to have been done. Giovanni asked to see the brushes with which the work had been carried out. Even then he could not understand, so Dürer picked up one of the brushes, and, while the old artist looked on, painted a lock of hair so much like nature and so beautiful that it might have been taken from a human head and laid upon the canvas.

Giovanni was delighted; he praised and honoured the young German, and gave him an order for his portrait. Dürer died at his home in 1528. A great painter and skilled engraver, he was also the father of etching, as well as one of the men whose art helped Venice on toward the glorious goal to which she was tending.

CARPACCIO, GIORGIONE, AND THE GREAT LITTLE SON OF A DYER

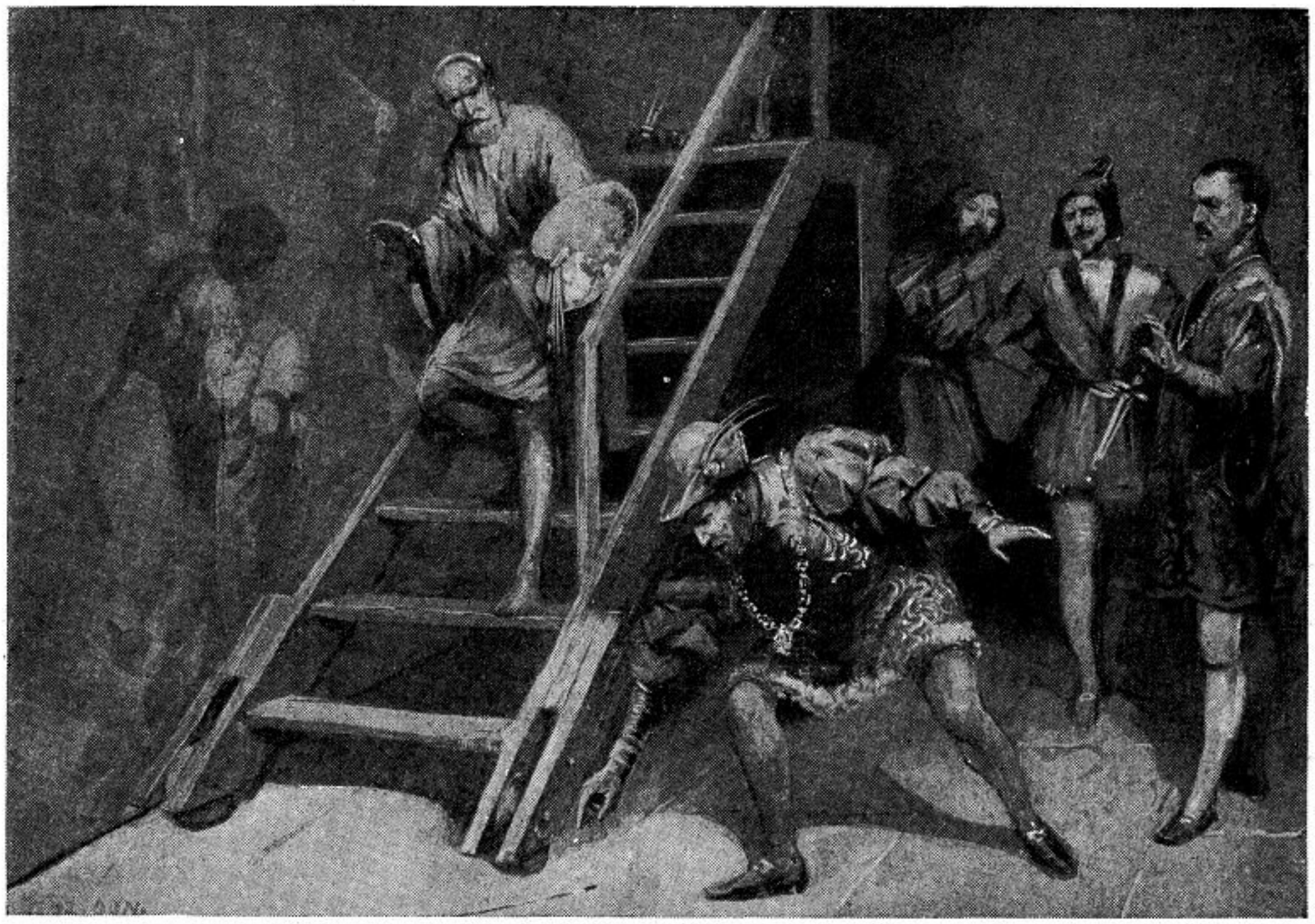
One of the first of the new school of artists to be influenced by the Bellinis was Vittore Carpaccio. He was born in Istria, about 1450, and lived 72 years. We have seen how the idea of painting scenes from life began to take the place of pictures which had been painted again and again in the same flat style. Carpaccio carried on the work in the noblest way. Some of the painters of his age took subjects from heathen books for their pictures. Carpaccio painted beautiful stories upon his canvases. His pictures told the story of the lives of saints and heroes; they were made to appeal to the mind and the soul, not, like some others, merely to the eye.

Another great man arose in these days. In 1477 Giorgione was born. As Giotto perfected the changes introduced by Cimabue, his master, into Florentine art, so Giorgione ennobled the art schemes of his masters, the Bellini family. Giorgione not only enriched the city by his wonderful frescoes and other paintings, but had a most powerful influence on the artists of his own day. He died when only 33.

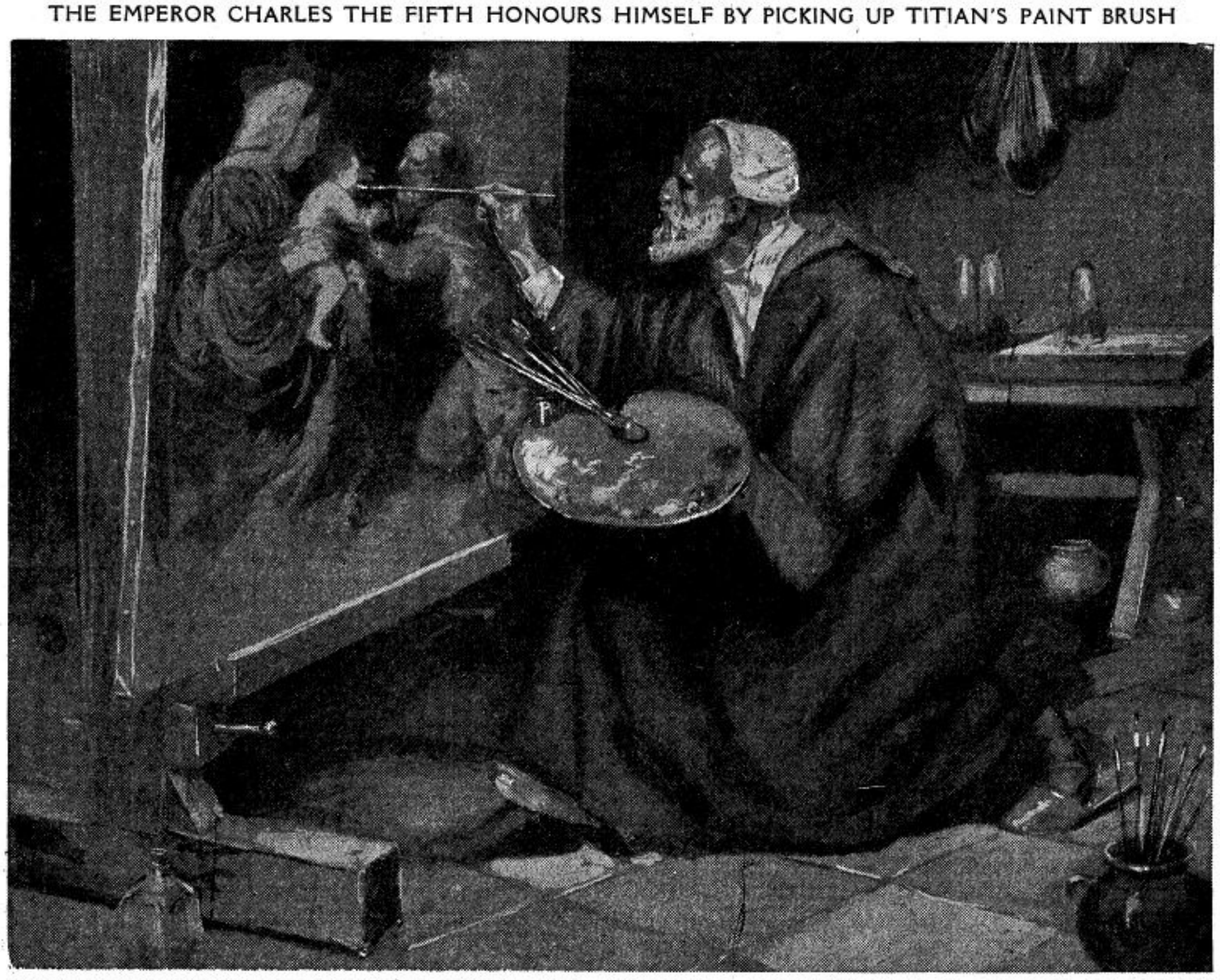
This was a wonderful age for Venice. Every rich man was willing to employ artists. They may not have paid well, but there was no very serious competition; and we find Giorgione, Titian, and others, painting articles of furniture, and other artists rivalling goldsmiths in the splendour with which they decorated buildings.

Much talent was wasted in this way. Some of the artists would do anything for money; Titian was, perhaps, the most grasping of them all. His mean nature

TITIAN, THE IMMORTAL COLOUR MAN



THE EMPEROR CHARLES THE FIFTH HONOURS HIMSELF BY PICKING UP TITIAN'S PAINT BRUSH



TITIAN, THE MASTER COLOURIST OF THE WORLD, TOUCHING A CANVAS "WITH A WARMTH DIVINE."

was never more apparent than in his treatment of another great man, Tintoretto, to whom we now come. His real name was Jacopo Robusti, and he was born at Venice in 1518, and died in 1594. His father was a dyer—a *tintoro*—and so they called Jacopo, his son, Tintoretto, or Tintorettino, meaning " the little dyer." The clever boy was a born artist.

He used to dabble in his father's dyes, and to splash the colours all over the walls and furniture until his parents must have found him a nuisance. Seeing which way the lad's genius was inclined, the father took him to Titian. Jacopo's apprenticeship lasted but a few days.

Titian went into the studio one morning and saw, lying on the floor, papers covered with drawings. He picked them up, and asked who had done them. Little Tintoretto shyly confessed that he had. Titian saw that they were the work of a genius ; he saw that this boy might soon become a rival to himself. He left the studio at once, and that day had the poor boy turned out. It was a shameful thing, but brave young Tintoretto was not to be beaten. His life became a miracle of activity. He set before himself two models —Michael Angelo for design ; Titian, his cruel master, for colour.

THE IMMORTAL PAINTER WHO LEARNED FROM WORKING MEN

He made models of wax on which to hang draperies for the figures he meant to paint. He copied tombstones and bits of broken statuary. He studied the methods of every artist in every studio into which he dared to peep. He went down into the square where the poor painters worked who painted common furniture and cabinets for sale, and studied how they got some of their effects. He followed the work of architects. He used to beg builders to let him decorate houses which they were erecting. Once he painted designs all round the clock which the builders were erecting in a tower. Another builder was putting up a new house, and Tintoretto insisted on painting the walls with lovely frescoes, simply for the cost of the materials he used. He would do paintings for chapels and churches and other buildings for practically nothing.

He did anything and everything to perfect his art and make his name known. He worked with marvellous speed, and, of course, the effect was not always good. But in time he made a very great name, and became one of the very greatest painters of all time. One story must suffice to show his passion for work and the marvellous way in which he carried it out.

HOW TINTORETTO ASTONISHED THE VENETIANS ONE DAY

The ceiling of the San Rocco School was to be decorated with a painting, and the artists of Venice were asked to send in sketches for the work. There were not many days for the preparation. The other artists made their rough plans. Not so Tintoretto. He had the space measured, and, with that zeal and speed which nobody could match, he painted his whole picture, and had it secretly fixed up on the ceiling and covered over.

When the day of trial came the others showed their sketches, while Tintoretto stood by. At last he drew away the linen covering the ceiling, and the company saw his splendid picture already fixed.

The last of the greatest Venetian painters was Paul Veronese. He was born in 1528 at Verona, whence his title, his real name being Caliari, or Cagliari. He lived in Venice from 1555 till his death in 1588. His pictures were characterised by the brilliance of colouring proper to works of the great Venetian school, but he had caught the spirit of painters in Rome, and gave to his work more dignity, grace of pose, and ease of movement than had been possible before his day.

Paul Veronese was a painter more for the palace than the church. His scenes were scenes of splendour, of great space and riches and luxury, so that it has been said that one of his paintings would convert a garret into a palace of vast size and delight. He was a great worker, but different in type from Tintoretto, taking careful pains with all that he painted.

PAUL VERONESE AND HIS FAMOUS PICTURE OF A MARRIAGE FEAST

In the Louvre at Paris hangs his picture called The Marriage Feast at Cana, showing 160 portraits of people who lived in Venice in his day.

With the death of Paul Veronese the sun of Venetian art set. But the afterglow has lighted the world for more than three hundred years, firing the enthusiasm of all the artists who have lived since.

While the glory of Venice as a sea power is departed for ever, her glory in art will never die. So long as her pictures last they will remain the treasures of the world.

The Great Stories of the World That Will Be Told for Ever

ALI BABA AND THE FORTY THIEVES

ALI BABA was a poor man who lived with his wife in a town in Persia, and one day he went into the forest to cut some firewood. He saw a band of forty thieves, and so he climbed into a tree and hid himself. The tree grew beside a great rock, and the forty thieves came to this rock, and cried: "Open, Sesame!"

A door opened leading into a cave, and the forty thieves went in and placed there the gold and silver they had stolen. Then they came out, and cried: "Shut, Sesame!"

Then the cave closed up, and they rode away. Ali Baba then came down from the tree, and cried: "Open, Sesame."

Again the cave opened, and he entered, and found himself in a sort of treasure-house, stored with sacks of gold and silver; and, seeing that it had all been stolen, Ali Baba seized as many sacks as he could carry, and took them home.

"Now," he said to his wife, "I will soon grow as rich as my brother Cassim."

And this thought pleased him very much, for his brother was a proud and haughty man, who had married a very wealthy woman.

"We must measure how much gold we've got," said Ali Baba's wife joyfully.

So she went to Cassim's house and asked for the loan of a measure. Cassim's wife wondered what sort of grain her poor sister-in-law had got. So she put some wax under the measure, and when the measure was returned to her she found, to her immense surprise, a piece of gold sticking to it. She at once told Cassim, and Cassim went to Ali Baba and asked him where he had got his gold from. Ali Baba frankly told his brother about the treasure-house in the rock, and told him how to open and shut the cave.

"I'll have all that gold carried away before Ali Baba gets a share of it," said Cassim to himself.

He at once took ten mules to the cave with the idea of loading them with all the sacks. He cried, "Open, Sesame!" and got into the cave, and danced with delight when he saw how much treasure there was. But at last he became so excited that when he wanted to take away the sacks he forgot the words that opened the cave.

"Open, barley!" he cried. "Open, wheat!"

While he was trying to think of the right word the forty thieves returned and found him in the cave, and killed him there.

The next day Ali Baba went to get some more gold, and he discovered in the cave the body of his brother, and carried it away and had it decently buried. Then, in accordance with Persian customs,

he took his widowed sister-in-law to live with him ; and with her came a clever female slave, whose name was Morgiana.

When the forty thieves found that the body of Cassim had been removed from the cave they were full of fear.

" So there's another man who knows our secret ! " said the captain. " But I know how to find him."

He disguised himself and went to the town, and inquired if a man who had been slain by the sword had recently been buried ; and he at last learned that just such a man had been buried by Ali Baba.

" Now," said the captain of the thieves to his men, " I must arrange to get all of you quietly into the house of this Ali Baba ; and you must come out at night and kill everybody there, and escape without being seen."

So he brought some of the huge leather jars in which the Persians used at that time to keep their oil, and he got a thief to get into each one of them, and covered them up, leaving a little space for air. He then put them all on some mules, and took with him one jar really filled with oil in case he should be called upon to show what he carried, and travelled at night from the forest into the town, and stopped before Ali Baba's house.

" I have brought my oil from a good distance," he said to Ali Baba, " and it is now too late to go to an inn. Will you kindly put me up for the night ? "

Being a kind-hearted man, Ali Baba welcomed the captain of the forty thieves, and told the servants to look after the mules and bring in the jars. Morgiana was sent to cook a supper for the strange guest. Finding that she had no oil to fry the meat in, she went to take a little out of one of the jars. When she approached the thief thought she was the captain, and whispered cautiously :

" Is it time ? "

" Not yet," said Morgiana.

She went from jar to jar and found there was a thief in each, and at last she came to the jar which was filled with oil. She heated the oil in a great kettle, and then crept up to the jars and poured in the hot liquid, and scalded all the thieves to death.

" Now we shall see what will happen," said Morgiana.

In the dead of night the captain tried to arouse the thieves ; but after peeping into the jars he saw that his men were all dead, and he rushed quickly out of the house. In the morning Morgiana told Ali Baba the whole story, and Ali Baba, much astonished, buried the dead thieves secretly the next night.

" But remember," said Morgiana, "there is one thief still at large ; and you must be on your guard, for he will never rest until he has killed every one of us who know his secret."

Morgiana was right. For the captain of the forty thieves soon returned in a new disguise, and set up as a shopkeeper, and tried to make friends with Ali Baba and get an opportunity of killing him. One day Ali Baba invited the captain to come to supper.

Now, there is a very strange law of honour which all Persians and other Mohammedans strictly observe. Even the very worst man among them will not kill anybody with whom he has eaten salt. So the captain of the thieves said to Ali Baba : " I should be pleased to sup with you, my friend, but I must confess I have a very curious taste. I can't bear the least bit of salt in any dish."

" Oh, that's easily arranged ! " said Ali Baba. And he told Morgiana not to put any salt in the meat for supper ; and that made Morgiana suspicious.

" So your new friend is a man who will not eat salt with you ! " she said. " I must have a look at him."

She did so, and, in spite of the new disguise, she saw that he was the captain of the thieves. Moreover, she saw a dagger hidden in his dress. So she said to Ali Baba : " Tell your strange friend that one of your slave girls will come and dance before him after supper."

When the supper was over she entered the room, attired in a beautiful dress, and began to dance the dagger dance. She whirled round and round in graceful movements, holding a dagger in her hand, and then rushed at Ali Baba and pretended to stab him. Then she lightly danced up to the captain of the forty thieves, but, instead of pretending to stab him, she drove the dagger into his heart.

" I recognised the villain ! " she said.

Then she showed the dagger hidden in his dress. Ali Baba then married Morgiana to his eldest son, and gave her as a dowry a large share of the treasure in the cave in the forest.

THE CARGO OF WHEAT

SEVEN hundred years ago Stavoren was the greatest and most beautiful city in Holland. An immense dyke protected it from the sea; and the townspeople were very rich because they had many ships sailing to different parts of the world and bringing back riches from the strange countries they visited.

The people of Stavoren were very proud and hard. The wealthiest and the hardest and the proudest of them all was a lady. One day she sent for the captain of her greatest ship, and said to him:

"Set sail at once, my man, and bring me back a large cargo of the most precious thing in the world."

"I dc not understand," said the captain. "Do you want fine silks, or golden jewels, or diamonds?"

"I have given you my orders," replied the lady. "I am the richest person in Stavoren, and I am resolved to astonish all my neighbours. Find out what is the most precious thing in the world, and bring me a large cargo of it."

The captain ran to the port and set sail at once. On reaching the open sea he called his men around him, and told them what his mistress had ordered him to do.

"Now, what, in your opinion," he said, "is the most precious thing in the world?"

"Gold," said his first mate.

"No," said the second mate. "Fine silks are worth more."

"In my opinion," said the third mate, "diamonds are the most precious things in the world."

The captain asked each of his men in turn, and each gave him some different advice. But a little cabin-boy said:

"I really know what is the most precious thing in the world, because I have known what it is to be without food. It is wheat."

The captain saw the truth of this. Setting full sail, he steered into the Baltic Sea and landed at the town of Danzig. There he bought a cargo of magnificent wheat, stowed it in the ship, and put out on the return voyage.

In his absence his proud mistress called on all the rich townspeople of Stavoren, and said to them:

"I have sent my captain to bring me a cargo of the most precious thing to be found in the world."

Naturally, everybody in Stavoren became very curious, and they waited in great impatience for the return of the ship. In a few days the captain came back.

"How quick you have been!" said the lady. "What have you brought me?"

"A large cargo of the finest wheat in the world," said the captain.

"Wheat? You wretch! Wheat?" cried the furious woman. "I asked for the most precious thing in the world and you bring me some vulgar, ordinary, common wheat! I shall be the laughing-stock of Stavoren! Throw the whole cargo into the sea!"

And, in spite of the pleadings and the cries of the crowd of poor, hungry beggars, this was done.

On her way home the lady met the captain. His face was set and stern.

"You bad woman!" he said. "The day will soon come when you will know what it is to feel hungry. Then you will think of the good wheat you cast away."

The woman laughed scornfully, knowing she was the richest person in Stavoren. But when she reached her house a great storm began to rage, and some days afterwards she received news that all her ships had been destroyed.

In the tempest a great bank of sand was thrown up by the waves before the port of Stavoren. The ship in which the captain had sailed was wrecked and buried in the sandbank, and all the commerce of Stavoren was ended.

For some months the proud lady managed to live in luxury by selling her jewels, but when the springtime came all her money was gone. She went to her rich friends and begged for food, but they laughed at her, and turned her from their doors.

One morning in April, as she was passing by the old seaport and looking at the sandbank, she saw that it was covered with green verdure. The wheat she had thrown into the sea had been cast up by the storm, and had sprouted in the mud!

"It is a miracle!" she said.

Knowing now what hunger was, she waited patiently until autumn came and all the wheat was ripe, and then she led the poor people of the town to the sandbank, and told them they could gather the corn. When it was all harvested they went into the inland country, and took the repentant woman with them, looking after her kindly.

THE KNIGHTS AND THE SHIELD

In the days of old a gallant horseman was riding along a lonely road. Presently he came to a wide, open space, where he was attracted by a magnificent statue, which stood facing the south. He had travelled the world over, but never had he seen anything more imposing.

On the summit of a lofty pedestal stood a figure representing Victory. Her sword was sheathed, her shield lay at her feet, and her brows were entwined with a wreath of laurel.

"Ah," he exclaimed, "what a costly monument! I declare the shield is of solid gold!"

He was so much taken up with wonder that he did not hear the approach of another traveller from the opposite direction. He, too, stopped to admire the statue. Great was his astonishment when he heard a voice exclaim, "The shield is of solid gold," for from where he stood it was clearly silver.

"What a strange mistake to make!" he thought. "I must see this man who does not know gold from silver. Pardon me, my friend," he said, "but your eyes are playing you some trick; the shield is not gold, but silver."

"How mean you, sir?" returned the first knight. "Do you dare to tell me that I don't know gold when I see it?"

"I do not wish to tell you anything," exclaimed the second knight; "but I know silver when I see it, and I declare that this shield is silver and not gold."

"It is gold, I say."

"Nonsense!" replied the other knight.

"You insult me, sir," said the first knight angrily, "and I would have you know that I listen not to such talk from any man."

"I never thought to cross swords with one who knew not gold from silver; but if you will make a quarrel of it I am not the man to refuse you."

So the two men drew their swords and prepared to fight. Hardly had their blades crossed, however, than they heard a voice calling:

"Oh, my good masters, be not hasty; take care what you are about!"

The knights paused. They saw a girlish figure clad in white running toward them. She placed herself between them, and asked as she looked at their flushed faces:

"What is it you are about to do, good sirs? For what cause is it you are about to fight?"

"The cause for which we are about to fight is just," said one. "Yon knight accuses me of having said what is not the truth."

"And he says no less of me," exclaimed the other. "Come, stand out of our way, little maid. And you, sir, prepare."

"Stop!" said the maiden, in a voice so commanding that the knights obeyed in spite of themselves.

"Say no more, maiden," said the first knight, "for men of honour do not look at such matters with women's eyes. Come," he added to his enemy, "are you ready?"

Once more the swords clanged together; once more the voice of the girl sounded bidding the combat cease.

"Stop, I tell you!" she cried. And the men could not but lower their weapons. "Now, sir," she went on, "you who have come up the north road, step in front of the statue and tell me what you see."

The knight looked, and answered in a humble voice:

"I see, my lady, a golden shield."

"And now, sir knight from the south do you step behind the statue and tell me truly what you see."

The knight looked carefully, and answered humbly:

"I see a silver shield."

"Even so," answered the maiden; "the shield is silver on one side and gold on the other. Thus both of you are right, and both of you are wrong. Now tell me what you will do."

"Our quarrel is at an end," said the one, "for we were both right."

"Yes," answered the maiden, "that is so. And now," she added, "let me see you shake hands and be friends."

The two knights laughed heartily as they did so. And the little maiden suddenly changed into a tall and stately woman. She was so fair and so queenly that the two knights fell at her feet.

"Go," she said, "and be my knights faithful and true—my name is Peace."

Even as she spoke her name she vanished.

And the two knights followed down the path, talking like old friends.

There are two sides to every question.

THE BOY FIDDLER OF SICILY

PERO was a merry, simple lad, and he lived in a village in the beautiful island of Sicily. His parents died when he was young, and when he was fourteen he set out to make his fortune. On the road he met a beggarman, who said: "My son, I am starving. Give me something to buy some bread."

"You can take my wages," said Pero, "and I will go back and serve three years more."

"You are really as kind as you are simple," said the beggarman, and as he spoke he changed into a bright Spirit. "I give you three wishes."

"Well," said Pero, "give me, please, a violin that will make everybody dance, and a gun that will never miss, and the gift of speech, that nobody can refuse me anything."

The Spirit granted Pero these wishes, and Pero turned back to the farm. Seeing a pheasant fly by, he fired at it to test his magic gun. The bird fell, but before he could pick it up the farmer ran out and seized it.

"Well," said Pero, "you can have it if you like to dance for it."

He played on his violin, and the farmer capered like a madman.

"Stop, Pero!" he cried at last, "and I'll give you a thousand crowns."

Pero received the money, but as soon as his back was turned the farmer ran to the magistrate and denounced him as a robber. There was little mercy for robbers in Sicily in those days. Pero was quickly arrested, tried, and condemned. But just as the hangman was putting the rope round his neck he asked the magistrate to let him play one tune.

"Don't give him the violin!" cried the farmer.

But Pero had the gift of speech, and nobody could refuse him anything. The magistrate gave the violin to him, and Pero played on it, and the magistrate and the farmer and the hangman and the spectators danced to his playing. He played till they were weary; he played till they were worn out; he played till the soles came off their boots, and still he played. And the magistrate at last promised that if he would stop he should go free. Pero then came down from the scaffold, and took his gun and his violin and his thousand crowns, and returned to his native village, and, having the gift of speech, he won the prettiest girl in Sicily as his wife, and settled down.

HE PLAYED TILL THEY WERE WEARY, HE PLAYED TILL THEY WERE WORN OUT

PUNCH AND JUDY

It was all the fault of Toby. You know Toby, of course—Toby, the wicked little dog belonging to Mr. Scaramouch, the showman. Punch one morning was in a very merry humour. He had got up early, and put on his scarlet and yellow dress and his peaked hat with tassels at the corners, and he was dancing and singing to himself upstairs as he waited for his wife Judy and the baby, to take them out for a walk. Toby, however, ran up into the room where Punch was dancing, and Punch tried to stroke him, saying :

" Hallo, Toby ! How do you do, Mr. Toby ? Hope you are well, Mr. Toby ? "

But the wicked little dog jumped up and bit poor Punch's long nose. This made Punch very cross, and he seized Toby and threw him out of the window just as Scaramouch, the showman, was passing by. Scaramouch rushed into the house, with a long stick in his hand, and said to Punch :

" Hallo ! Hallo ! Hallo ! What have you been doing to my dog ? Do you want to learn how to play the fiddle ? "

" Yes," said Punch, getting over his bad temper in an instant. " I should like to know how to play the fiddle."

" Well, isn't that sweet music ? " said Scaramouch. And he gave poor Punch a hard, ringing blow on the back. But, just as he was going to strike again, Punch wrested the stick from his hand, knocked his head clean off his shoulders, and then threw him out of the window.

Punch then became a very dreadful person to live with. When Judy brought him the baby to mind he at first rocked it softly on his knee and sang to it, but as soon as it began to cry he threw it out of the window.

" I'll teach you to throw the baby out of the window ! " cried Judy, hitting him with the big stick.

" Oh ! Oh ! " squealed Punch. " I don't like such teaching. But perhaps you do."

And he seized the stick and thumped Judy unmercifully, and threw her also out of the window.

" Now all the house is quiet at last," said Punch. " I'll go for a ride."

But Hector was a very savage horse, and it threw Punch on the ground ; and a doctor ran up to give help.

" Have you had a fall, or are you taking a nap on the grass ? " said the doctor.

" I'm dead ! dead ! " shouted Punch. "Or, if I'm not dead, I'm speechless."

" You are shamming," said the doctor. " This is the sort of physic you want. The more you take the better you'll feel."

And he began to belabour Punch with the big stick. But, by a desperate effort, Punch got up, and wrestled with the doctor, and got the stick from him, saying :

" What's good for the patient ought to be good for the doctor. It is now your turn to take physic."

And Punch killed the doctor with one tremendous blow, and set off home, saying to himself :

" Doctors always die when they take their own physic."

On the road home a footman and a blind man got in his way, and Punch felled them to the earth with his big stick. But when he opened the door of his house there was a policeman waiting for him.

" I didn't send for you," said Punch.

" No, I'm sent for you," said the burly policeman.

" But I don't want a policeman," cried Punch angrily.

" But a policeman wants you," was the reply. " You've been murdering people in a frightful way."

" Yes," said Punch. " This is how I do it."

And he knocked the policeman down with the big stick. An officer then entered, and after the officer came Jack Ketch, the hangman.

" I'm come to take you up," said the police officer.

" And I'm come to take you down," said Punch, knocking the officer over, with a great shout of laughter.

" But I'm Jack Ketch," said the hangman, in an awful, hollow voice.

" Well, ketch that, then ! " cried Punch. And down Jack Ketch tumbled by the side of the officer and the policeman.

At last, however, Punch was taken to prison to be hanged, and the hangman got the fatal noose ready.

" How shall I put my head into that thing ? " said Punch.

" Like this," said the hangman, thrusting his neck into the noose.

Punch at once pulled hard at the rope, and so hanged the hangman, and in the excitement Punch got out of prison ; and you can still see the old rascal wandering about at the present day with Scaramouch, the showman, and Toby.

PROVERB STORIES

Every nation has its proverbs—short, pithy sayings in which are contained much wisdom. The stories on this page illustrate some of these proverbs.

THE FARMER AND HIS SACKS

Repay Kindness with Kindness

A FARMER was taking his grist to the mill in sacks thrown across the back of his horse. On the way the horse stumbled, and one of the sacks fell to the ground. It was too heavy for him to lift, and he was at a loss to know what to do. As he stood wondering he saw a horseman coming toward him.

When, however, the rider came nearer the farmer saw that he was none other than the nobleman who lived in the great house at the top of the hill. It was impossible to think of asking help from one of his rank.

The nobleman, however, was something more than a man with a title—he was a gentleman, and he dismounted.

"I see you have had something of a mishap, friend," he said. "It is fortunate I came along just now, for help is not always handy on these roads."

So saying, he took one end of the sack, the farmer took the other, and the load was once more placed on the horse's back.

"My lord," said the farmer, lifting his cap, "how can I thank you?"

"Easily enough, my good fellow," said the nobleman. "Whenever you see anyone in a difficulty, help him all you can, and that will be thanking me."

THE BAG OF PEAS

There's no Luck in Laziness

"Do you believe in luck?" said a king to one of his officers.

"Yes," answered the officer, "I do."

"Ah!" laughed the king. "I am afraid you could not prove to me that there is any such thing in the world."

"That may be, your Majesty," answered the officer; "but, if it please you, we might try to find out. I have thought even now of a plan."

He whispered in the king's ear, and his Majesty replied:

"Very good, very good indeed; let us try it without loss of time."

So that night the officer hung a bag from the ceiling of one of the rooms in the palace. What it contained none but the king and the officer knew. Then two men were put into the room. When the door was shut one of the men who believed in luck laid himself down in a corner and prepared for sleep; the other looked about him, and at once saw the bag hanging from the ceiling.

He reached up and put in his hand, and found some peas. "One might have a worse supper," he thought, as he took out a handful and ate them.

Presently he came on some diamonds, but in the dark he thought they were mere stones, and of no value. So he threw them toward his companion, saying:

"You may take the stones for your idleness."

In the morning the king and his officer came to the room, and told each man he might keep what he had found. The one man got the peas which he had eaten; the other got the diamonds.

"Now, your Majesty," said the officer, "what do you say?"

"Truly," answered the king, "you seem to have the best of the argument. There may be such a thing as luck; but it is as rare as peas mixed with diamonds, and so let none hope to live by luck."

THE TWO KINGS

The Second Word Makes the Quarrel

THERE was once a king who sent a message to the king of a neighbouring country, saying:

"Send me a blue pig with a black tail, or else——"

To this the other king replied:

"I have not got one; and if I had——"

When the first king got this answer he flew into a great rage, and declared war against the other. For many weary months fighting went on, but at last the two kings arranged a meeting.

"What did you mean," said the first, "by saying: Send me a blue pig with a black tail, or else——?"

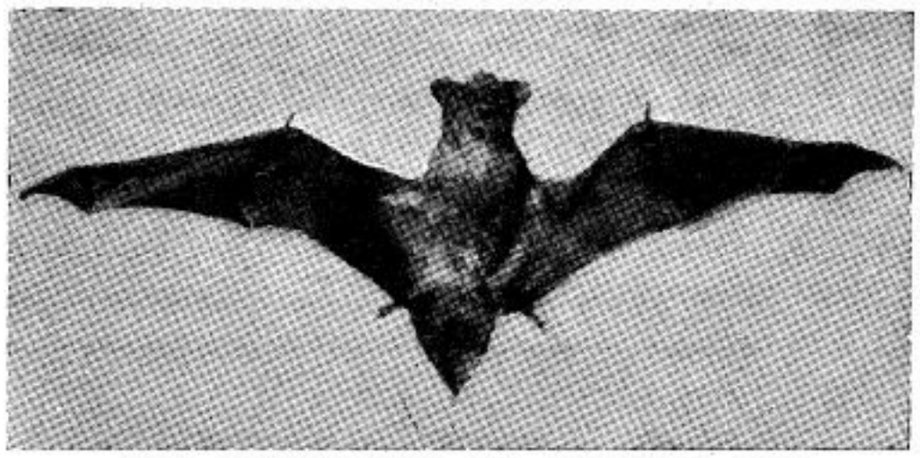
"Why," answered the other, "I meant a blue pig with a black tail, or else some other colour. And now let me ask you what you meant by your message: I have not got one, and if I had——?"

"My meaning was simple enough; for, of course, if I had had such a pig I should have sent it."

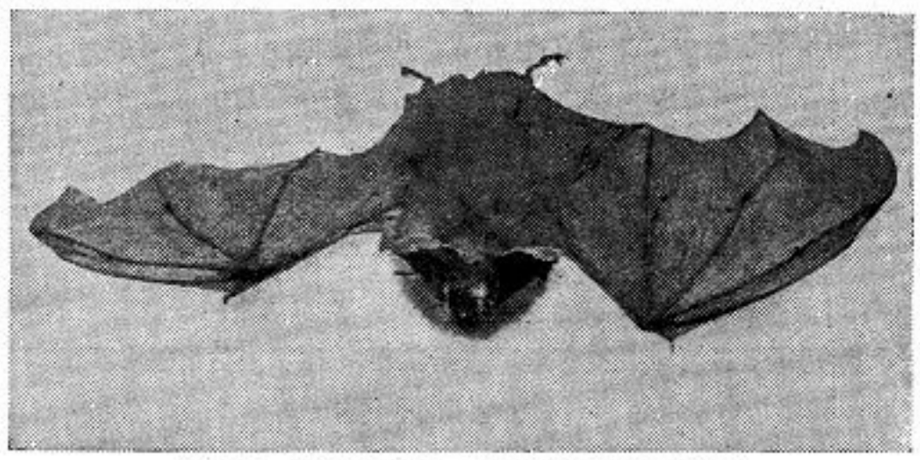
"Dear me, how foolish we have been! Let us make peace and be friends."

So peace was made, and the story was written in the annals of both countries to serve as a warning to those who should come after to be slow to take offence.

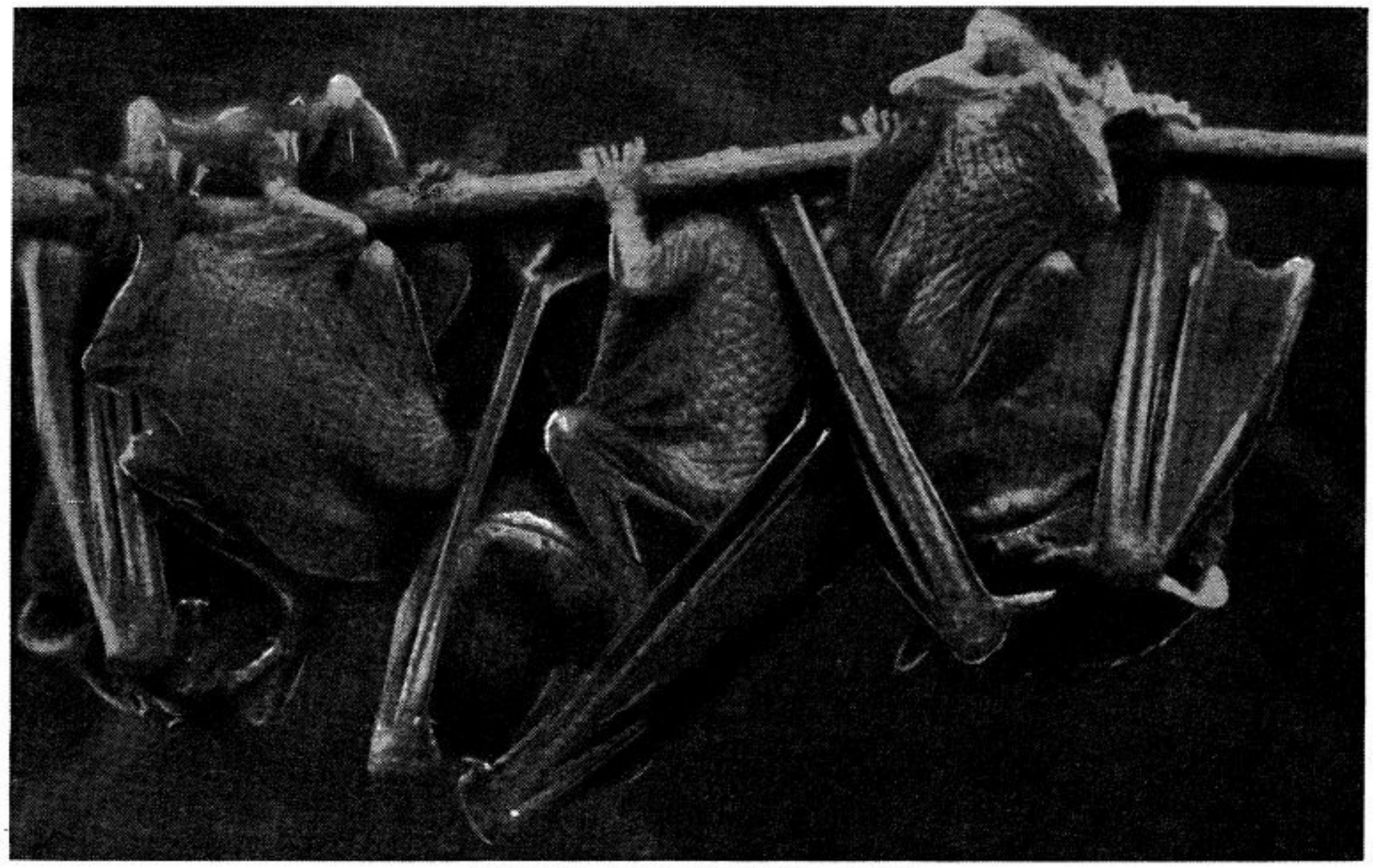
MEMBERS OF THE GREAT BAT FAMILY



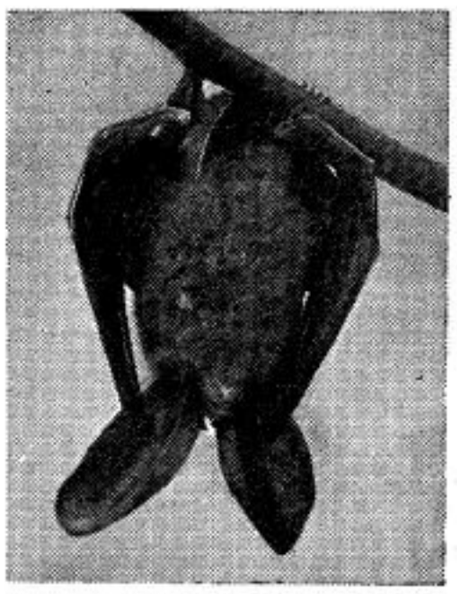
THE GREAT BAT—OR NOCTULE BAT



THE AFRICAN FALSE VAMPIRE



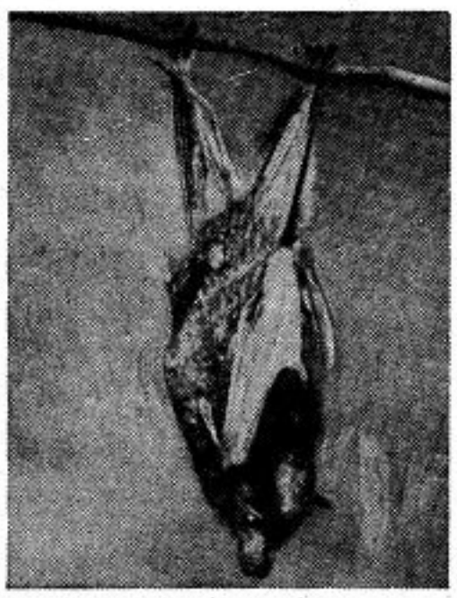
NOCTULE BATS AS THEY SLEEP



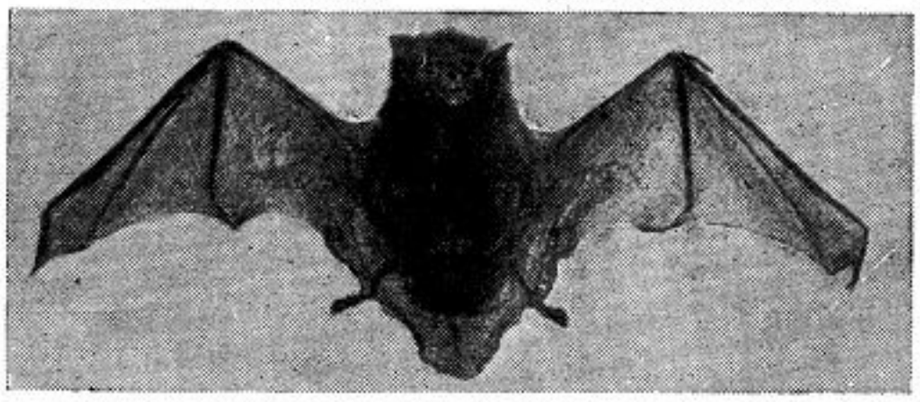
LONG-EARED BAT

NATTERER'S BAT

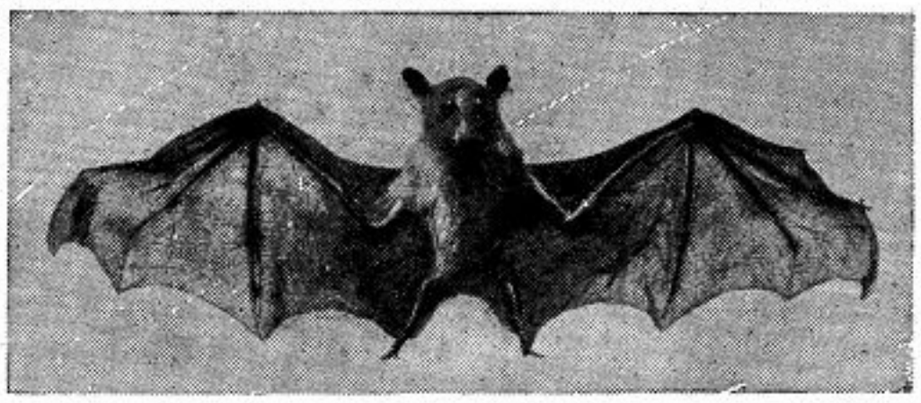
GREATER HORSESHOE BAT



MALAY FOX BAT

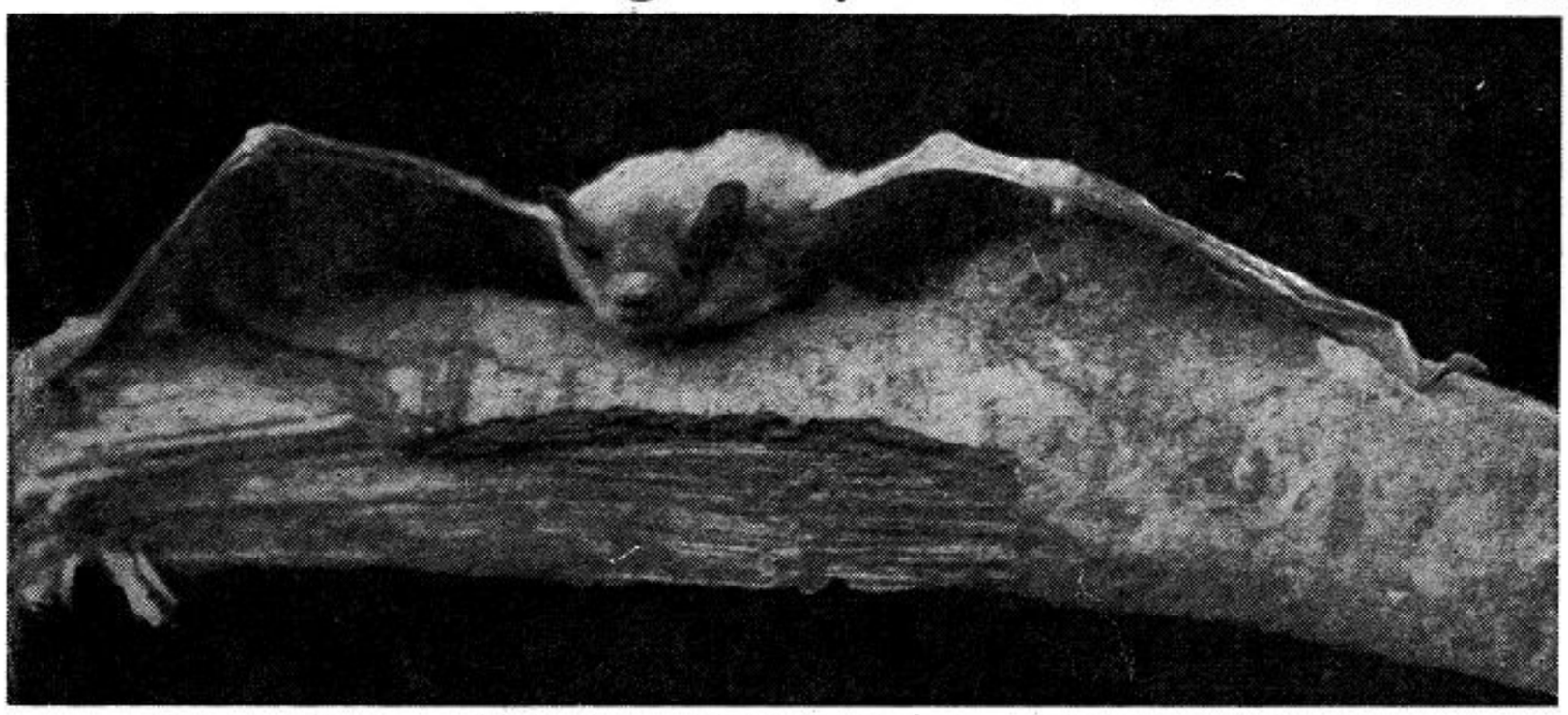


THE HAIRY-ARMED BAT



THE ABYSSINIAN EPAULETTED BAT

The photographs on these pages are by Messrs. Douglas English, J. J. Ward, and C. W. R. Knight



BATS AND THEIR FRIENDS

Where the bee sucks, there suck I:
In a cowslip's bell I lie;
There I couch when owls do cry.
On the bat's back I do fly
After summer merrily.

Shakespeare's song, sweet and melodious on the lips of his happy Ariel, is like an allegory, a burst of anthem from kindly life's own pulsing heart. Insect, flower, bird, and mammal are all there, with the poor bat as the dainty sprite's own courser.

Four great orders of created wonder march to the music of that verse, and it is wonderful to think of the ages Nature must have taken to fashion the picture Shakespeare gives us in a flash. Repeatedly Nature has given a long, slow turn to her kaleidoscope, and many an age elapsed before the outline of bee and cowslip, bat and owl, was perfected.

The bats did not come singly. They issued from reptile forms, they and their kindred, among the first successful mammals. The mammal has warm blood, and is hairy. A multitude of such mammals appeared, little timorous, insect-eating creatures. They succeeded, but not all by following the same line.

Many were driven by fear for their lives to hide in the Earth, but the bats did a thing like magic. They must have followed their prey about the rocks and have had many a tumble; they pursued them into the trees and flopped from branch to branch, and to the ground, spreading out arms and legs to break the shock of their fall. Many never got beyond the parachute stage.

What that was like we see in many animals which glide through the air but do not fly. The so-called flying lemur, the cobego, is the best example of the type. It arose from the same stock as the bats and the other insect-eaters, but instead of wings it has flexible folds of skin, one on each side, from the throat to the hind quarters, and this natural parachute, expanding at the will of the animal, carries it through the air, in a downward direction, 200 feet and more. But that is no more flight than the air-trips of the flying fish.

Something better was needed. The birds were urged into feathers and flight; the reptiles flaunted their scaly leather-like wings up in the clouds, and still Nature demanded better and better. Then came this line of insect-eaters which gave rise to the bats, animals which created real wings from flesh and blood and bone, without scales, without feathers. An entirely novel and marvellous creation branched off from the same ancestral stock to become the ancestors of all the bats, whether they eat insects or fruit, or draw blood. Consider this natural

wonder, this little winged mammal, which has sacrificed free arms and legs, invested them in a living webbing, and flies superbly.

If you could take away the webbing you would see a little animal with two arms and hands and two hind legs. But though it has the same number of fingers as we have, they are strangely formed. The thumb is very short, and, instead of a nail, has a claw or hook which is used when the bat is not flying, to enable it to walk or to hang itself to anything upon which it means to rest when it folds its wings to go to sleep.

THE LITTLE BIRD WITH THE VERY LONG WINGS

The bones of the palms of the hand are not short and like ours, but very long, and joined to them are the finger-bones, which again are very long. This great length of bone is to support the web of the wings. The web stretches from the shoulders down the two bones of the arm over the bones of the hand, and down the tips of the four fingers. Then, from the under side of the arms, it reaches down to the legs, as far as what would be our ankles, and between the legs to join on to the tail.

Thus the spread of the wings is very big for the size of the bat. The biggest bat in England has a body three inches long and a tail one and a half inches in length—only four and a half inches all told, yet its wings, when spread out, measure fourteen inches from tip to tip.

There is no other animal in England that we know less of than the bat. The reason is that it only comes out at night. Its eyes are so formed that it must sleep when the sun is shining, but at night it can see splendidly. It lives entirely on insects, and by eating these does good work for man. We cannot see the insects it catches, but the insects are in the air all the same; and if the bats did not catch them they would be a great nuisance to us.

THE BAT'S AMAZING SENSE OF FEELING WITHOUT TOUCH

There is something about the bat which none of us can understand. Added to its good sight, it has the most wonderful power of feeling its way through the air. There is a great network of nerves and veins all over its wings, and there are clusters of nerves about its nose which act as a sort of telegraph to control the wings as the little animal flies about in the dusk. A man who gave his life to the study of animals once tested bats in a strange way. He got some bats whose sense of sight and smell and hearing had gone from them. He turned them loose in a room in which were many corners and obstacles against which they were likely to dash themselves. They flew without fear about the room, and never came in contact with anything that might hurt them. Then the man strung many threads across the room, but the bats flew between them as easily as if nothing were there. When the man placed his hand in the way of their flying, though they could neither hear, see, nor smell, they avoided it.

Bats are like birds in this—that their blood is very hot, but there is a strange difference. The bird dies if it cannot keep warm. The bat, however, goes to sleep in winter. Its sleep is so like death that you would think the bat in its winter sleep dead. It almost ceases to breathe, and its body, so warm in summer, is in winter almost quite cold.

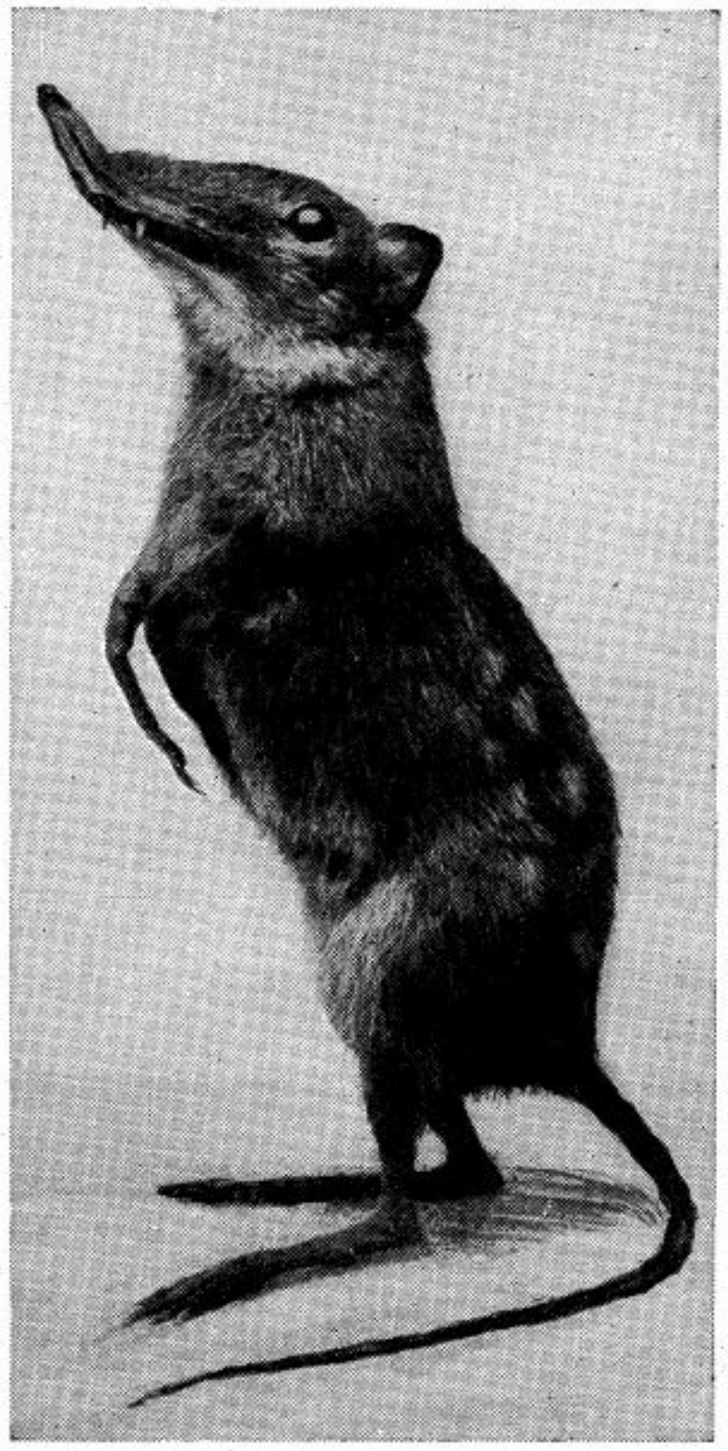
THE GIANT BATS OF THE EAST THAT LIVE ON FRUIT

All the English bats, of which there are about twenty varieties, eat insects, but there are foreign bats which do great mischief. The fruit-eating bats do not live in this country, but in Japan, Australia, the Pacific Islands, the Malay Islands, India, Ceylon, Madagascar, and South America. The biggest of these measures nearly five feet across the wings. It is called the flying fox because it has red-brown fur and a head like a fox. As they eat a great deal, they cause much damage to the crops, and in some places the natives have to tie up the growing fruit in baskets, to keep the bats from eating it at night.

The nastiest bat of all is one of the vampire bats, called the desmodus. This attacks cattle and horses and poultry, and even human beings, as they lie asleep. With its sharp teeth it makes a tiny hole in the flesh, and draws large quantities of blood from its victim. In some parts of the world it has been found impossible to keep poultry, owing to the dreadful habits of these bats. It used to be supposed that the bite of a bat was fatal to life, but that is not so. It is true, however, that should they find a sleeping man's feet uncovered, they can make a wound without waking him, and draw blood enough for a vampire bat's meal.

QUEER LITTLE INSECT-EATERS

THE COMMON SHREW



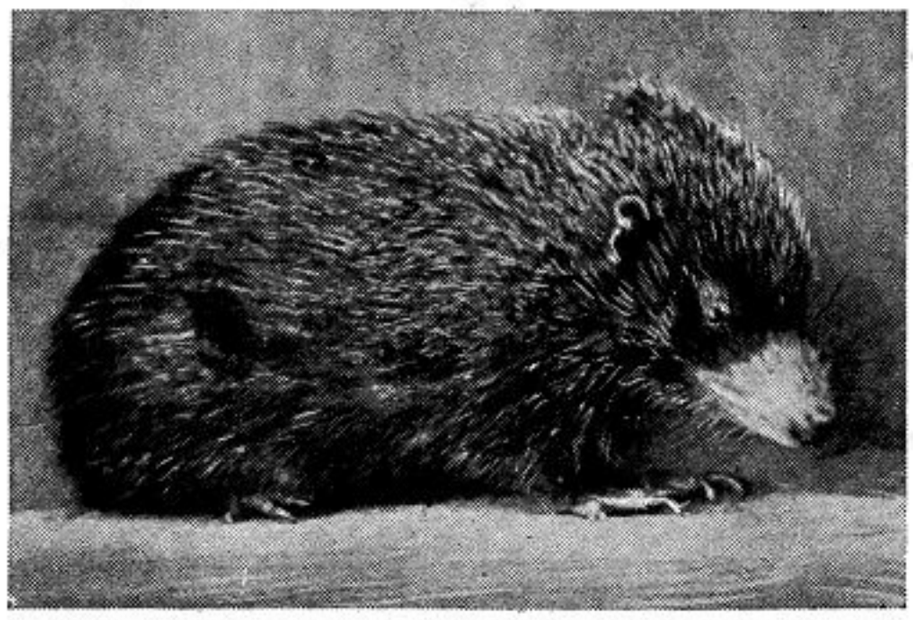
THE LONG-NOSED JUMPING SHREW

THE PYGMY SHREW

THE MOLE

THE WATER SHREW

THE QUAINT-LOOKING SOLENODON OF CUBA



THE TENREC THAT ROAMS BY NIGHT

THE HEDGEHOG HAS A DRINK

There is nothing more startling than the operation of the vampire. It performs its surgery at dead of night in a darkened room, and, while drawing its meal, supports itself in the air by the beating of its wings. We marvel at the kestrel as she hangs with rapidly moving wings in the air, at the humming-bird poised at the gateway of a flower; but this winged mammal, stealthily sucking blood while balancing like a living airship, displays a proficiency not excelled by any creature.

THE TERRIBLE ANIMAL THAT WILL HAVE TO PERISH

That leads us to a terrible conclusion. The bloodsucking bat will have to go. It cannot alter. Unlike the rest of the bats and insect eaters, it has no grinding teeth, and it is so accustomed by ages of habit to a diet of blood that its throat and stomach have grown too small for anything but fluid. Yes, the vampires which have this hateful way of gaining a living will have to be exterminated, and so will the flying foxes, which live near plantations and ruin the fruit of men's labours. So destructive are they in the fruit-growing areas of Australia that flame-throwers, like those used in the War, have been used in Queensland to destroy them.

But with the exception of certain fruit bats and the vampires all the bats are helpful allies of man. The British group is a splendid array—the greater and lesser horseshoe bats, the long-eared, the barbastelle, the pipistrelle, the noctule, the hairy-armed, the serotine, the rough-legged, Natterer's, the whiskered, and one or two believed not to be residents but visitors, like chance migrant birds.

THE MODEST, HARMLESS, AND QUEER LITTLE BATS OF BRITAIN

They haunt belfries, barns, old sheds, trees, clefts, and crannies, anywhere and everywhere, and issue at night to hunt and munch as they fly. England has some fantastic forms, which have appendages to their noses like leaves and blossoms sprouting on an animal instead of a plant; but ours are modest and unassuming contrasted with foreign bats. Ceylon has in the Kerivoula picta, bats which are so brilliantly coloured as to look like butterflies. There is an American species which catches and eats small fish. Some bats are white, and a Malayan bat is naked but for a fringe of hairs round the neck.

Bats are devoted mothers, and carry their young with them, clinging to their fur, but the naked bat, having no fur for baby bats to cling to, has evolved a living cradle; a deep fleshy pouch on the underside of the body in which the thriving infant is carried. With that in mind, and the further strange fact that some bats have added sucker discs, like the implements of the octopus, to their thumbs and feet, so enabling them to climb the smoothest surfaces, we must bid adieu to the wing-handed folk, one of the most fantastic, astonishing, and successful of all Nature's experiments.

What that same wizard Nature can do from the same materials we shall now see as we turn to the great assembly of animals called the Insectivora. They have that name because the peculiar character of their pointed teeth enables them to penetrate the horny cases in which many of their victims are sheathed.

THE WINGLESS LONG-NOSED COUSINS OF THE BATS

They are all long-snouted, they all have furry coats, and the majority of them are creatures of the night and the underworld. But note the exceptions. The hedgehog has converted part of his hairy covering into spines, and can roll himself up like a woodlouse. Some, like the tupaias, have taken to the trees, and many forms have adapted themselves brilliantly to life chiefly spent in the water. The variety in habit and structure is immense, and, though the mole is extremely primitive, with all the evidence of its lowly origin manifest, still it is full of wonders. We see our mole, not yet blind, behaving with as fatal an indifference to its eyes as the penguins to its wings. Indeed, its cousin, the golden mole, is now absolutely sightless.

We see a supreme wonder of natural economy in the largest of animal necks—the giraffe's, which consists of only seven vertebrae, like a man's or an elephant's; yet it requires nearly seven times as many vertebrae to make up the tail of one of the little tenrecs.

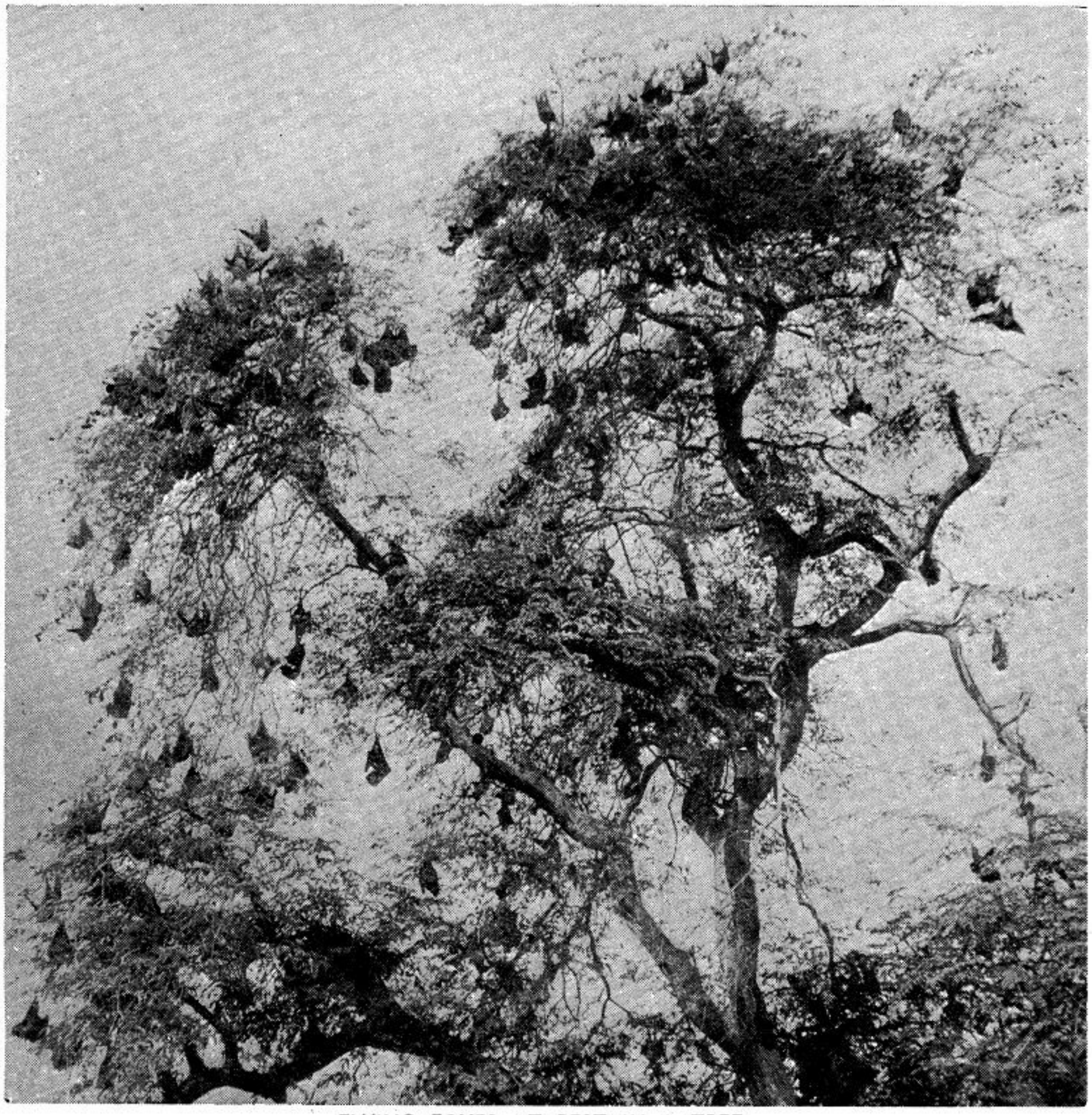
Such things are not to be explained. What we have to remember is that tremendous tests have been applied to this order. From the ancestors of the insectivores came not only the bats, but the great cats. Down in the rocks is the connecting link between the leopard and the shrew, between the tenrec and the tiger.

The insect-eaters that survive remain truest to the ancestral type; yokels

in a rustic school which has given the world some of its grandest and most powerful forms. There was a place for modest stupidity, and with smooth inferior brains these animals have filled it, in many climes, leaving ambition and betterment to those of their cousins in whom the latent fire of animal genius burned.

And glad we are that it is so. The insectivores owe almost nothing to man, but man owes half his fortune and more to the insectivores. It is always so close a fight between man and insect, always so grave a hazard that the insect may win, that, were some fell stroke of destiny suddenly to withdraw the aid of the Insectivora, our crops and harvests, the things we grow for food, medicine, and clothes, would fall before unchecked myriads of tiny foes. They would starve us by eating all herbage off the face of the Earth. The Insectivora are our dull uncomprehending guardians against that appalling contingency; so let us rejoice that they did not all develop into tigers!

We have noted the progressive weakness of the common mole's sight, so must see what he gains by his sacrifice. Probably it is increasing engineering skill. Next to the worm he has done more than anything to plough the world's soil. He is a superb tunneller, a master engineer who constructs beautiful galleries leading to a marvellous hall or fortress, with an almost equally elaborate nursery for the little ones.



FLYING FOXES AT REST IN A TREE

Perhaps there has been exaggeration of the directing skill with which these hidden wonders are wrought, but critics go to the

opposite extreme in suggesting that many of the galleries are purposeless. They forget that the mole, which is a voracious feeder, is constantly burrowing for worms and larvae, and sinking wells for water—hence tunnels and descents are condemned by them as useless.

Damage may be done here and there to lawns and flower-borders by moles, but the balance in the little sable gentleman's favour is enormous. To estimate his night's labour we have to imagine a man excavating, between sunset and sunrise, a tunnel 37 miles long !

Far and near the mole and its allied forms roam. The desman is of the family tree, long-muzzled, flat-tailed, a superb swimmer, whose webbed feet dig tunnels 20 feet deep in the banks of Asian streams where leeches and water insects afford it ample diet. There is a web-footed mole in North America which lives far inland. The waters which called for the special faculty for swimming have left the mole, or the mole has left them, but the webs on the feet proclaim the past.

THE USEFUL SHREW, AND HOW HE HAS DAMAGED HIS CHARACTER

Next in order comes our old friend the hedgehog, born blind, with prickles soft and white as cotton, and squeaking when its mother is long absent, like a baby pig. Hedgehogs are dull, stupid things, content with their magnificent armour and the security of night-hunts and hidden beds for day and winter.

We once had near relatives of the hedgehogs in Europe, but now we must go to Asia for them and find them in rat-like creatures called the gymnuras. Although rat-like in externals, the gymnura, stripped of his jacket, is marvellously like a hedgehog in his bones, but he cannot convert himself into a ball as his spiny cousin does.

The shrew is often called a destructive mouse, whereas he is a priceless aid to us as an insect-eater. If he escapes that penalty of misunderstanding, he is the victim of an age-long susperstition which attributes to him poison, paralysis, and pestilence to man and beast. His only offence is against the nose, for he has a strong disagreeable odour. In that he is not exceptional, for this defence is common to many shrews, of which the world has no fewer than 120 species.

"There's richness for you," as Mr. Squeers said of the watered milk to the poor scholars of Dotheboys Hall. It is, numerically, a rich assemblage. The tupaias or tree-shrews are kings of the greenwood tree, wonderfully like squirrels, in spite of their long flexible snouts. This feature, however, finds its most extravagant development in the shrews whose trunk-like nose gives them the name of elephant shrews. Yet they are as agile as crickets, leaping, by means of their abnormally long hind legs, as if they had once tried to be little kangaroos.

THE FINE WORK DONE BY THE LOWLY ORDER OF INSECT-EATERS

As bats have a fish-eater, so have the shrews, in a wonderful creature called the otter-shrew, a name which carries its own story of the apparent lines of progress followed by this species. Yet perhaps the web-footed shrew is even more notable for a novel method of mastering fate. Not only is it web-footed ; it has produced extraordinary little sucker-pads on its feet for an unparalleled purpose—so that in seeking its food at the bottom of the water it may cling to stones and other smooth faces and not be carried up against its will by buoyancy, unfed.

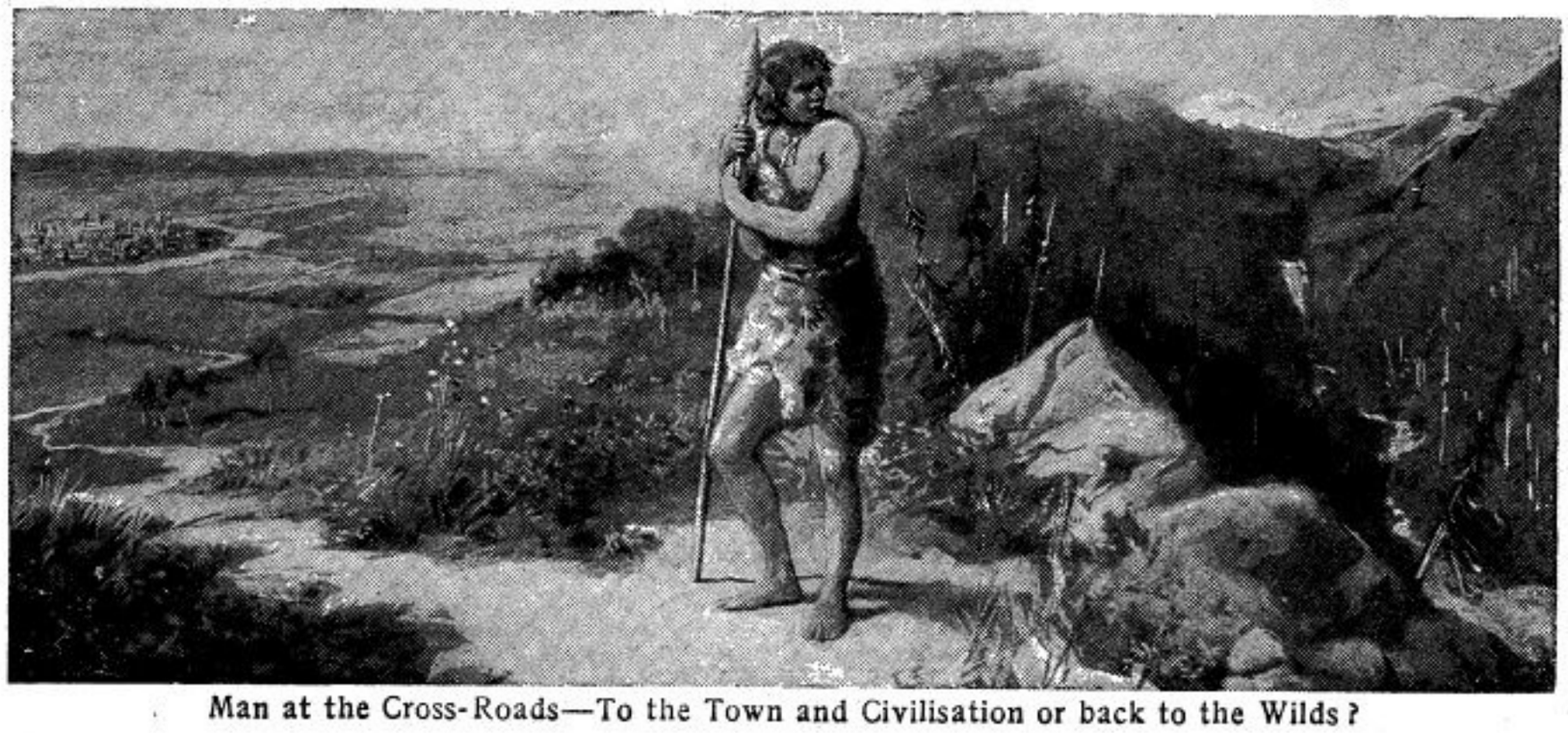
We should like that type in our English ponds, but we do not envy our Indian friends their musk-shrew whose odour makes uneatable anything it touches ; and we do not covet the king of the order, the Madagascar tenrec, tailless, 16 inches long, with spines hidden in his hair, and a ferocious bite. Tenrecs might become too numerous : the female of one species has as many as 21 infant tenrecs at a birth. Fortunately, these animals are generally insectivorous, and the solenodon, a dismal rat-like creature with alarming claws, is devoted to similar good work.

THE BEAUTY IN A RACE OF PLAIN AND SOBER LITTLE FOLK

There, all too briefly sketched in, we have something of this great but lowly order of insect-eaters. It gives us the tiniest mammal in the pygmy shrew ; it gives us hair, fur, prickles ; it gives us the lustre of the golden mole's fur. Is it not a mystery that such beauty should have been wasted on an animal which has let itself become blind?

The moles are generally plain, sober, even repulsive little folk, but this gaudy one might stand for the emblem of their order. In their lives and occupation they are to mankind like the hue of that lustrous coat, pure gold.

The March of Man from the Age of Barbarism to the League of Nations



Man at the Cross-Roads—To the Town and Civilisation or back to the Wilds?

MAN FEELS HIS WAY TO POWER

LET us halt for a moment and remind ourselves of the nature of the hero whose adventures we are following, chapter by chapter, in his journey through Time.

Never was such a hero. We are not reading of a magic horse, or a grisly giant, or a comical dwarf, or an Arctic explorer, or a millionaire. We are reading about something which has never been seen, which cannot be handled, which cannot be defined or described even by the greatest man in the world. But is there anything in the world more real to us?

It is something which has produced giants and dwarfs, dragons and fairies, mythical kings and fabulous monsters. It is something which has also fashioned the world of actuality in which we live—the world of great temples and marvel-working hospitals, of ships that fly in the air and ships that swim under the sea; the world of comfortable houses with hot-water pipes, electric light, and windows through which we can look at sunshine and storm; the world of the daily newspaper filled with tales from every quarter of the Earth; and the world of the wireless telephone, anaesthetics, antiseptics, the telescope, and the microscope.

Everything we know in ourselves, everything that has made history and changed the course of human life, is the work of this wonderful thing, this invisible and intangible and indefinable thing, the Mind.

But cannot we form some rough and ready notion of what it is like before we follow it from savagery to the first adventures of Civilisation? What is Mind?

At least we can say this: *It is Life trusting to itself.*

We know that each bird builds its nest exactly as its parents built theirs before it was born. We know, too, that a caterpillar makes itself a wonderful dwelling called a cocoon, although it has never seen such a thing before. There we are looking at Life trusting to instincts, leaving itself entirely in the hands of impulses which come from it knows not where. But in *mind* Life is self-conscious and self-reliant.

It *experiences* things consciously, reflects upon them, stores them into a wonderful department of the brain called Memory, and makes use of them for fresh adventures. It receives from the outside world all sorts of impressions, and weaves them into a garment which we may call *habit*, but a garment which is always being patched and improved by fresh experience and enlarged reflection. The animal is driven; *the mind drives*. The animal accepts; the mind questions.

The mind, then, is Life seeking adventure. Now, Life exists everywhere. But so

far as we can see it is only in the brain of man that Life has fashioned an instrument which enables it to push on into the fields of new experience and across the oceans of fresh discovery.

But wait a moment. There are many human beings less intelligent than animals, whose lives are far lower in the scale of being than the lives of many birds and insects. Life, then, can only push on *when the brain of a man is willing;* when it responds, that is to say, to Life's longing for new experience and greater power.

LIFE CAN ONLY TRAVEL AS FAST AS MAN'S BRAIN ALLOWS IT

It is like this. In many countries of the world Life is still travelling on foot; in many other countries on horseback or camelback; and in even the most civilised countries it is travelling in all sorts of ways —on foot, horseback or camelback, donkey-cart and carriage, tramcar and train, Ford car and Rolls-Royce, aeroplane or submarine. That is to say, Life can only travel as fast as the brain of individual man will allow it to travel, and the brains of men are as different as the means of locomotion in a modern nation.

Now we can turn again to our Adventurer, where we last left him, with a feeling that at least we know something about him. He has climbed up from the stationary plant to the moving reptile, from the reptile to the mammal, and from the mammal to the human mind. He has pushed the body of man through all these changes, and now is putting forth all his mysterious energies to enlarge the organ of understanding in that body—the body of savage man.

Savagery, wonderful as it is, far transcending the power of birds and beasts, is nevertheless not enough. Onward, onward! No rest till the Earth has been turned topsy-turvy to discover its ultimate mystery, and the very heavens have been forced to declare the final purpose of Creation. Who is it that can do this? It is Life in partnership with the willing brain of man, and that partnership is mind—the Human Mind.

MAN BEGINS TO FEAR THE LIGHTNING AND THE THUNDER

Picture to yourself the savage in the first town ever built, probably under the shadow of the Kurdistan mountains, somewhere between those two great rivers called Tigris and Euphrates. He has lost much. He is no longer perfectly free. He is no longer as fearless and as careless as the animals. He fears lightning and thunder, he prostrates himself at an eclipse, he sacrifices some of his animals to gods who are at once cruel and indifferent. And he fears man. Other creatures like himself—who have learned to stand upright and to use their front legs as arms—descend upon him in ordered packs, brandishing terrible weapons of death, beating drums of terror, shouting battle-cries which make the knees tremble with fear.

But something he has gained. He need no longer hunt for his food. He has heads of cattle, flocks of sheep, and fields of corn. Nor need he seek his food in its raw state. His women grind the corn between stones and roast his meat over a fire. And he has amusements. He has learned to draw pictures. He has invented a speech which enables him to tell stories. He can make sounds of music. He has discovered that clay can be not only worked into many shapes, but also put into his fires and baked almost as hard as stone. Yes, he has many amusements.

All the same, he is bothered by laws. Something inside him says, *This is right—That is wrong.* The head of his tribe sends him here and there. He must make things for other people, do things for other people, expose his body to the risks of death for other people.

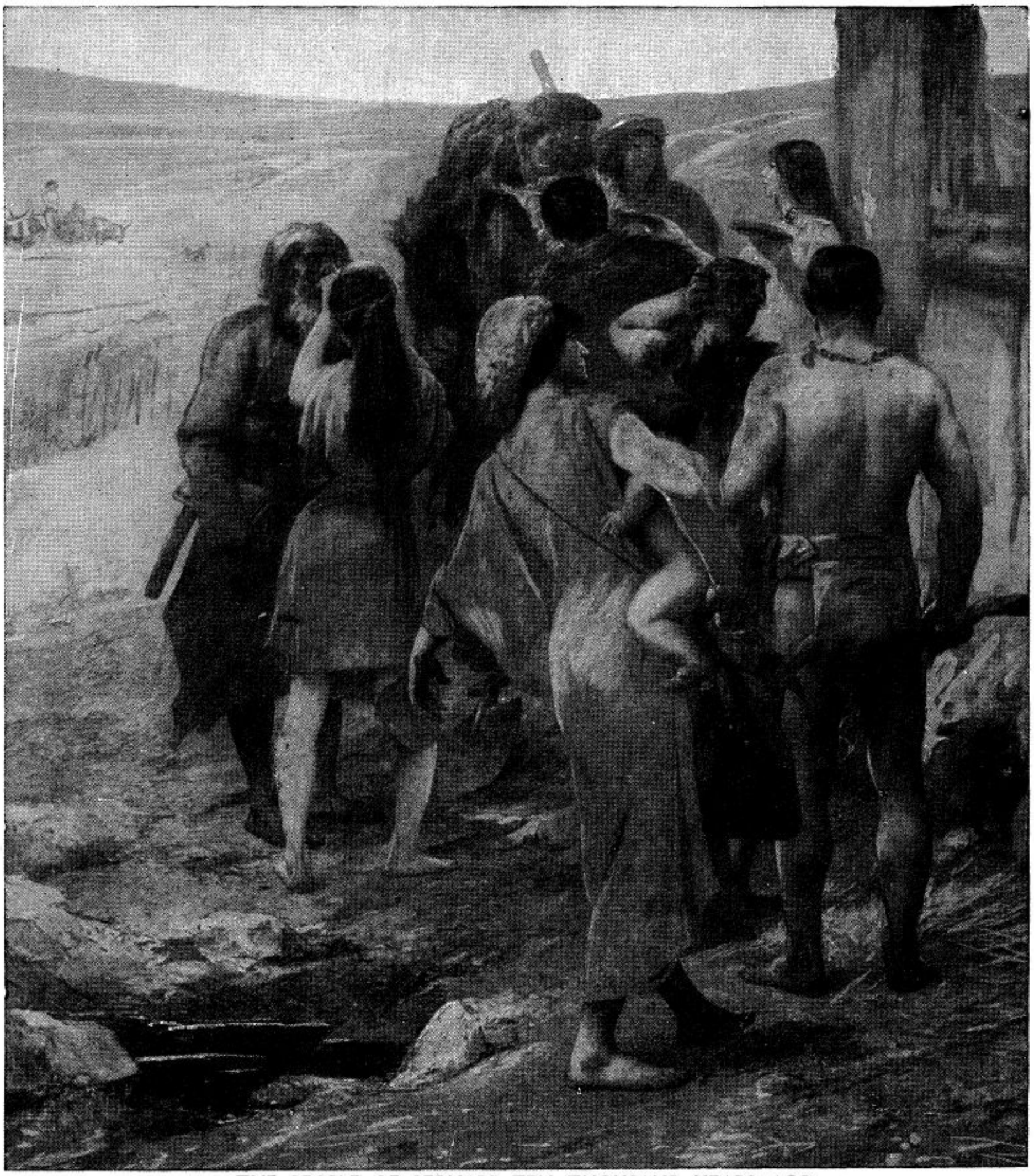
MAN STANDS BETWEEN THE HILL AND FOREST AND THE TOWN

And the gods! Surely it was happier when men lived like the animals. What animal makes an altar of stone, and beats itself till the blood comes, and sacrifices other animals on the fire of the altar?

This town, too, smelling and crowded and noisy, and threatened by war, can it compare with the happy cave on the hillside, where the freshness of dawn woke one like the song of a bird, and twilight fell with a peace that descended as a blessing?

These questions represent a crisis in the fortunes of human history. On the one hand was the noisome town, pointing like a finger-post to Civilisation, and on the other, the hills and the forest calling man back to Instinct and Stagnation.

To some men the town was the clear road of the future, but to others the call of the wild was the irresistible call of happiness. Thus it came about that the great family of mankind split up into two branches, the one following Reason, the other following Instinct; and to this day



THE PEOPLE OF PERHAPS TEN THOUSAND YEARS AGO

these two branches still flourish in every quarter of the globe.

Life's one hope of advance lay in the brain of those savage men who saw in the town not only a means of safety from wild beasts and man-enemies, but a means of endless amusement. They saw the advantage of cooperation. Their brains told them that in partnership with others they might do many wonderful things. This man loved carving, this man could only be happy making pots, this man thought of nothing in the world but making shields, this man spent his days in learning from the patriarchs of his tribe stories of the past ; and the women—were they not happier grinding corn together, talking together as they made garments, going in great companies down to the river for water ?

Then came another step towards civilisation. Men sat watching for their enemies from the hills, and a spy came to them with a report that their enemies were quarrelling among themselves. Into the brain of one of those watchers came a new idea. Instead of waiting to defend their town, why should they not swarm out together, climb the mountains, fall upon their enemies, and destroy them ?

There was no one in those days to speak of Peace. It has taken the human mind more than ten thousand years to realise

that war is the maker of war. To the savage his enemy was a wild beast, and the way to deal with a wild beast was to kill it.

Do not let us sigh over this sad past of the human mind. Just as all the glory of religion and all the beauty of religious ceremonial have ascended from the darkness of fear and the mire of superstition, so also have the loveliness of Peace and the beauty of moral character—self-sacrifice, courage, chivalry, and mercy—risen from the savagery of the battlefield. The human mind had to rise from the pit of its animal ancestry, just as all life had to climb out from the ooze of ocean shores. The glory of Florence Nightingale was her ascent from savagery; the sin of the German Emperor was his descent into the past of that savagery.

THE LITTLE TRIBE IS TO BECOME A GREAT NATION

When the townsman fell upon his enemies in the hills, and slew the warriors and dragged off the women and children into slavery, he was taking a tremendous stride, however bloodstained and terrible, towards civilisation, for he was giving a breathing space to Peace, and Peace is the first necessity of true science and art. By that incursion into the hills, that first war of aggression, savage man enlarged the borders of his town and the borders of human life. He pushed out his frontiers and made them safe, and within his territory he pressed on to the farthest frontiers of the mind. The tribe was to become a nation, and the country an empire.

All this happened at least ten thousand years ago, probably much farther back. Strange to say, we have better records in writing of a civilisation older than Egypt than we have of Egypt itself. For by the time man had journeyed to Egypt he had learned to write on papyrus, and papyrus crumbles and decays; but before the human mind had discovered papyrus and improved its sign-language, it had written its record on stone.

WHAT THE SCHOLARS OF EUROPE FOUND IN RUBBISH HEAPS

But there was an older way still of leaving a record of the first steps in civilisation—a record stamped upon the surface of the Earth. Far away in Chaldea are the remains of a system of irrigation, proving that the first makers of civilisation had a knowledge of Nature and science, and that they supported in those plains a vast population. It is as if the savage, emerging into civilisation for the first time, took a pen in his hand and wrote upon the earth, "I am a man." To look upon those remains is to be deeply moved by the thought of man's sublime courage and his indestructible faith in his power of self-reliance.

Also in Chaldea there are many humps of earth which remained there undisturbed till a hundred years ago. Then came scholars from Europe who dug down through those waste-heaps and came upon cities built of brick, and wandered through streets, entered the palaces of unknown kings and found libraries, with inscriptions on walls and other signs of civilisation.

The toil of scholarship has worn away the mystery of a writing unknown for a hundred centuries. Older than any Semitic language, some of the cuneiform inscriptions—as we call the wedge-like characters of the early empires—bear witness to the human mind in ages beyond all other record. At least that mind had conceived the idea of leaving a record. At least it could draw pictures, convey a meaning by signs, place its signature to the work of its hands. And there, too, it left a record of a considerable city built of brick; and a city is the first work of art on the border-line of savagery and civilisation.

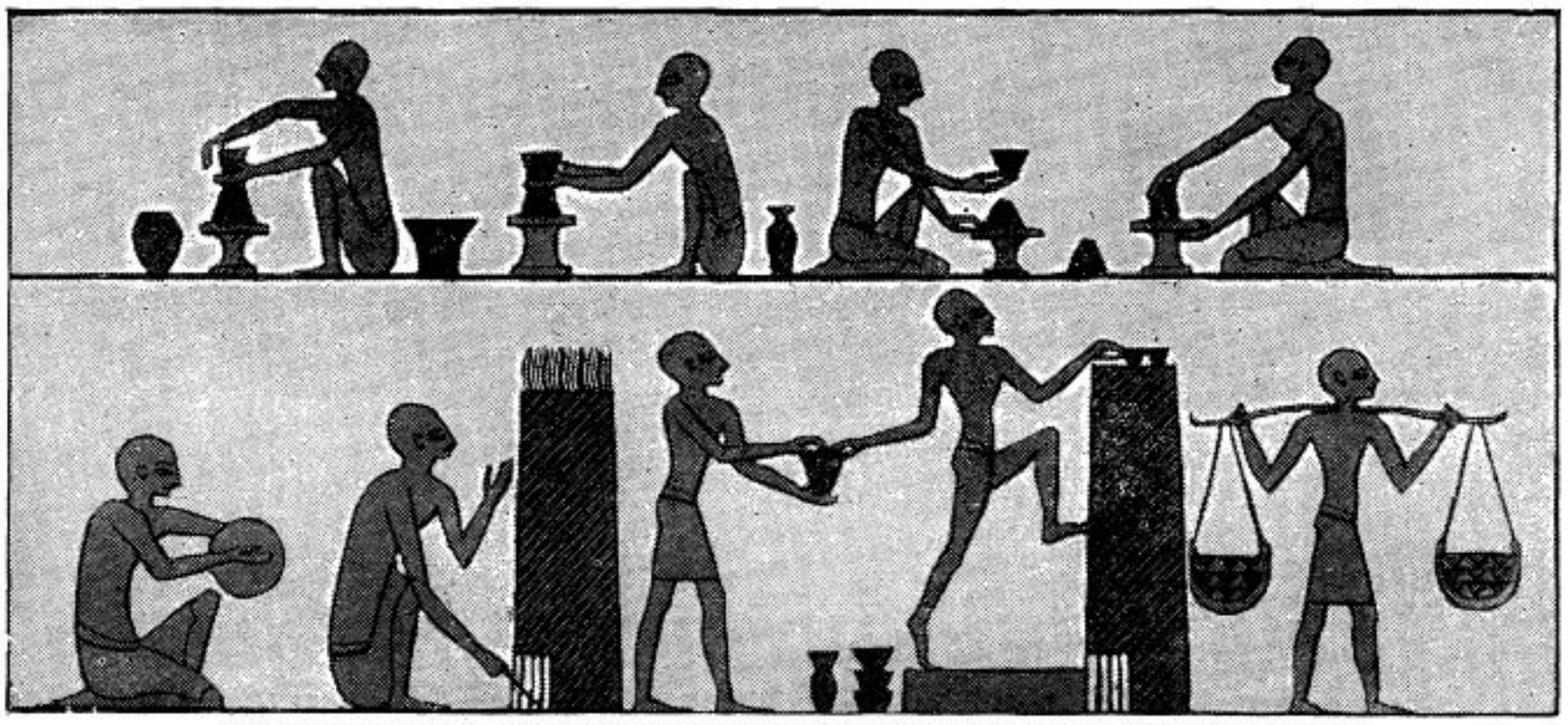
THE DISCOVERY OF SPEECH AND SONG AND HAPPY LAUGHTER

A marvellous journey already! Let us think of it as the Odyssey of the human soul travelling from a grunt to a song, from a frown to a smile.

Far away in the dark forests of Africa there are still savage men whose eyes are filled with the same perplexity which we see in the eyes of monkeys, whose brows are scored with the deep wrinkles of a perpetual frown, and whose lips have never learned to smile as the child of civilised parents smiles almost from the hour of its birth. Speech, song, and laughter were first heard in that wonderful dawn of civilisation when the human mind knew that it had found a path to more knowledge and more power, and felt itself already capable of Egypt, Athens, Rome, and civilisation.

Always on our journey we shall find the shadow of savagery dogging the advance of Mind, but henceforth we shall see that unconquerable Mind pressing forward with irresistible power, and the most astonishing up-rushes of divine inspiration to a dominion which is the greatest thing on Earth.

The Story of the Things We See About Us Every Day



This series of ancient pictures shows an Egyptian potter working at his trade

THE CHINA ON THE TABLE

THE poorest people can afford to have earthenware cups and saucers and plates on their tables. Few things in the house are cheaper than earthenware and crockery, and its method of manufacture, with its history, is quite a romance.

There are the powder of mountains and the bones of long-departed animals in the cups and plates and saucers we use at breakfast. Millions of years ago, granite mountains were formed in England, and in millions of years these were worn down by the effects of the weather, until they were slowly ground into powder. That powder settled down on the lower-lying land and became the finest china clay in the world—the famous clay of Cornwall.

The china clay is washed out of the granite rock by running water, and is then mixed with finely ground flints, Cornish stone, and the blue or ball clay of Dorset and Devon. It passes in liquid form through channels containing magnets, which pick up any particles of iron, for iron would make unsightly brown specks in the finished ware. Such is the clay for earthenware, but for bone china, the translucent porcelain for which England is famous, china clay, bone ash, and Cornish stone are the materials used.

For earthenware the clay is dried and rolled out by machinery; for china it is dried and kneaded by hand. It then goes to the potter in lumps like heavy dough. He is the knight of the throwing-wheel. This is a contrivance which has been very little altered in principle since the potters of ancient Babylon and Nineveh used wheels very much like it, before even the Bible was written.

The throwing-wheel revolves horizontally in a pan. It is a sort of disc, and the pace at which it goes round is fixed by the foot-brake which the potter controls, while the driving power comes from a fly-wheel at the other end of the table on which he works. The fly-wheel may be worked by hand or by machinery.

As the throwing-wheel spins round on its axle, the potter throws the clay. It sticks to the throwing-wheel, and goes round with it. Then the art of the potter comes into play. He moulds it as it spins, moulds it with his skilful hands or with the tools made for the purpose. Gradually the shapeless mass of clay becomes a cup, or it may be a basin or a vase—something merely useful, or something beautiful in shape. He works from the base upward, shaping the walls,

making them the right height and thickness. Then he puts aside the vessel to dry, so that it can be fixed on a lathe, and turned and smoothed. Not all articles are made in this way, of course. A beautiful cream-jug may be made in three or four separate pieces. For the making of plates, the potter fixes a mould to his throwing-wheel. This mould, filled with clay, is spun round on the wheel, an arm presses down upon it, squeezes the clay to the shape of the mould, and then pares it down to the proper thickness.

HOW THE CLAY VESSELS ARE BAKED IN THE OVEN

When all this is done, the more scientific part of the work has to follow. First of all, the vessels are placed with others in a drying-stove of moderate heat. After this they are packed in round fire-clay boxes, called saggers. The furnace is lighted, and the heat is drawn up all round the saggers, which remain in the furnace for over forty hours. The fire is then allowed to cool, and the saggers, on being opened, reveal what is called biscuit-china.

Patterns are put on by transfers or painted on, and the articles are dipped into a liquid glaze. Then they are put back in the sagger and placed in a glost or glazing oven, where a high temperature is maintained for about twenty-four hours. After cooling, the saggers are taken out, and we behold our finished cups and saucers, dinner plates or tureens. Pieces decorated after glazing are fired in a big fireclay kiln for ten or twelve hours.

If common earthenware articles like drain-pipes, ginger-beer bottles, and ink bottles are being made, they are not treated like this. They are placed in ovens so that their whole surface is exposed. Then two or three times, at intervals of half an hour, common salt is thrown into the oven through holes at the top. The salt does not touch the articles, but is turned to vapour by the heat, and, settling on the hot clay of the earthenware articles, forms a glazed layer all over them.

HOW A HORSE'S ILLNESS GAVE RISE TO A NEW IDEA IN POTTERY

Our English potters were remarkable men. The first with whom we need concern ourselves is John Astbury, who was born about 1688, and died in 1743. He was the first to manufacture cream-coloured pottery. He did more than that. One day he saw an ostler trying to cure a horse by blowing into its eyes the powder from a red-hot flint-stone. Astbury thought that flint-stones burnt to powder might be more usefully employed than as a doubtful medicine for horses, and, after experimenting with the powder, he found that it was a valuable substance for making pottery. At about this time there were two brothers from Amsterdam, named Elers, at work near Burslem, the English home of the pottery trade. These were the men who discovered how to glaze common pottery by scattering salt in the oven. But they had another secret—the making of a pretty red ware which they called Japanese. By pretending to be an idiot, Astbury got into their works and learned their secret.

One of Astbury's brothers married a Miss Wedgwood, the aunt of a boy named Josiah Wedgwood, who was born at Burslem in 1730, and died in 1795. When Josiah was only nine, his father died, and, though the family was a respectable one, it was very poor, and Josiah never went to school after he was nine.

THE MAN WHO RAISED POTTERY TO A FINE ART IN ENGLAND

After very hard struggles he built up a great business. He did so solely by merit. He discovered new materials for his pottery. He found out new processes.

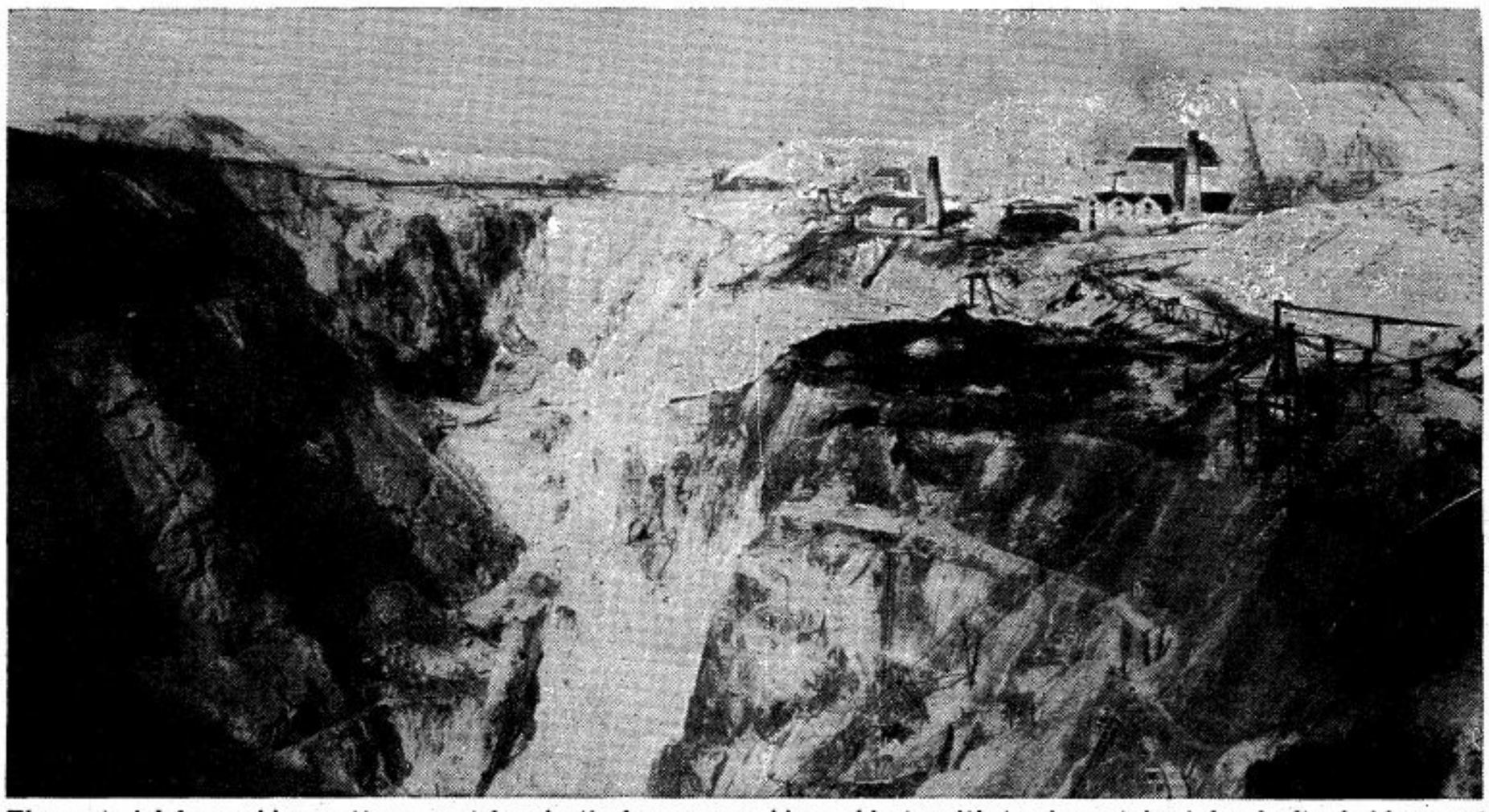
While he continued making good crockery for the table, he developed the artistic side of the industry until his porcelain ware was famous throughout the world. His scientific attainments were also considerable, and his fortune became large.

After Wedgwood's death the artistic side of the pottery industry showed signs of decline, but a revival took place, though on somewhat different lines, in the Lambeth works of Sir Henry Doulton.

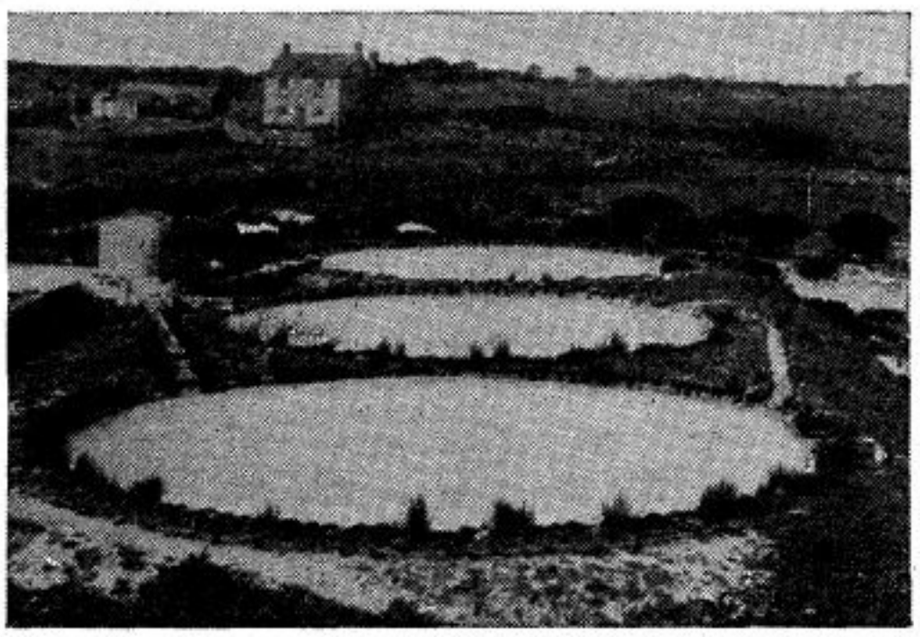
Sir Henry's father was in a very small way of business, making blacking bottles and other common things. But Henry was given a good education and later discovered the art of making drain-pipes of glazed earthenware. Until that time our drains had been simply channels of bricks, which let poisonous matter leak through in all directions. The Doulton pipes created a revolution in sanitation.

From that kind of work Doulton went on to the making of the famous Doulton ware. The Doulton works are today of world-wide renown, and many of our pictures were taken there.

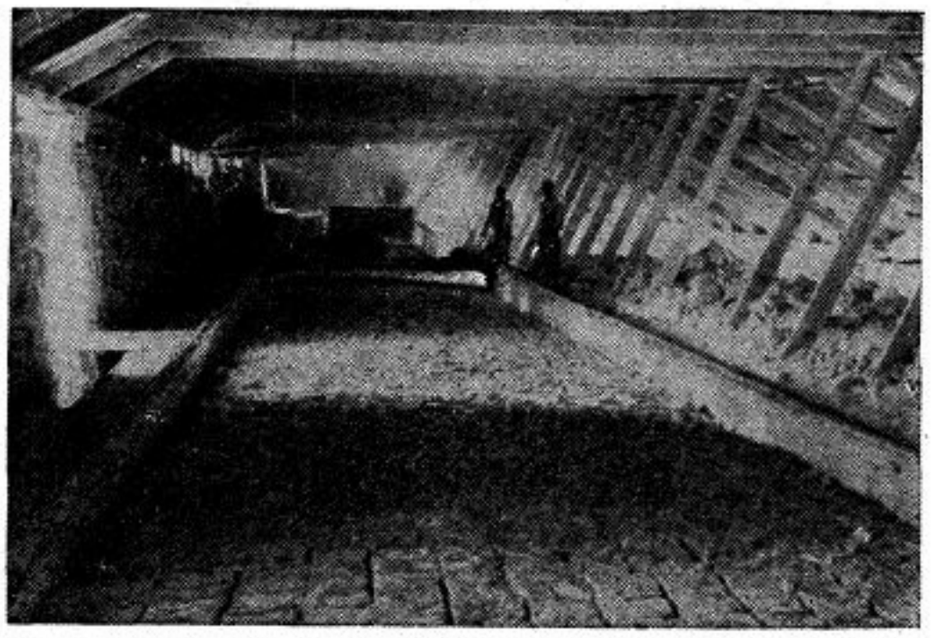
WHERE THE CHINA COMES FROM



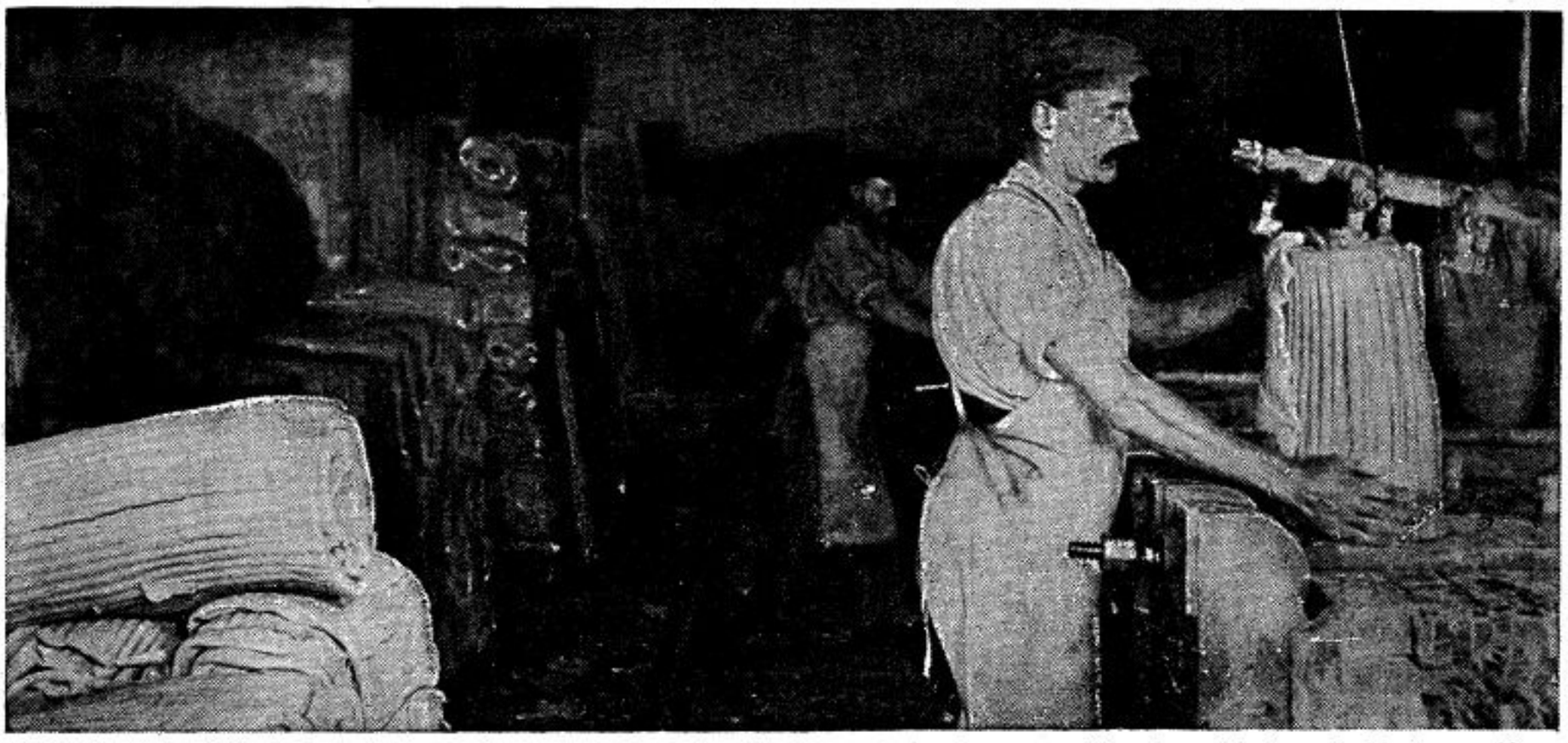
The material for making pottery must be plastic for easy working, able to withstand great heat, hard after baking, and white when finished as table or decorative ware. China clay, or kaolin, is the basis of such material, and the finest is found in Devon and Cornwall, in pits such as this.



The granite rock from which china clay is derived is crushed and washed, and the clay allowed to settle in pits. It is then mixed with finely ground flints and ball clay.

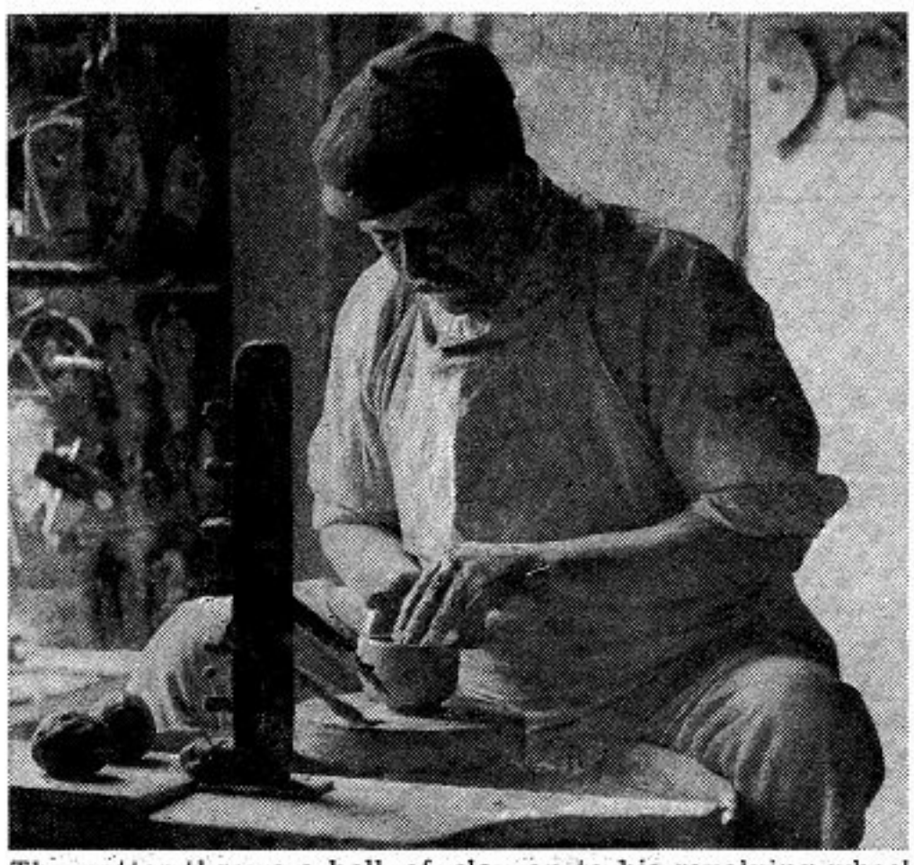


Iron particles in the mixture which would make brown specks in the finished ware are drawn out by magnets. Water is now pressed out. and the clay is dried in a shed.

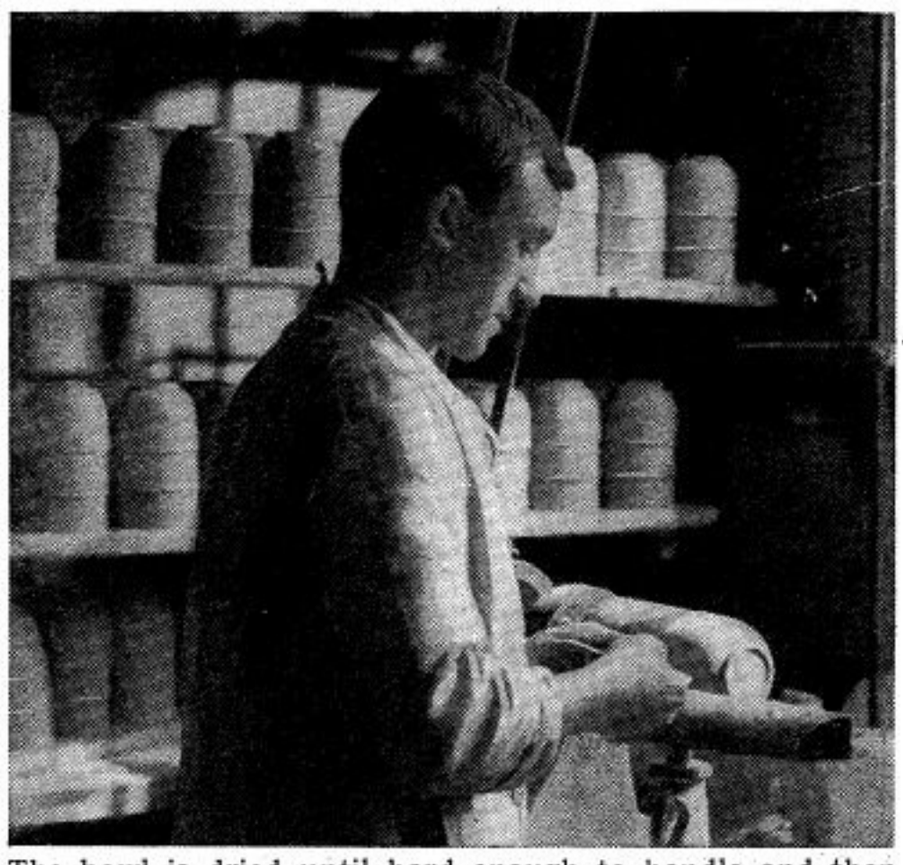


That the materials in the clay may be thoroughly mixed, it is put through a pug-mill, where it is kneaded into a uniform paste, rolled out. and cut off, as we see here, in pieces suitable for the potter.

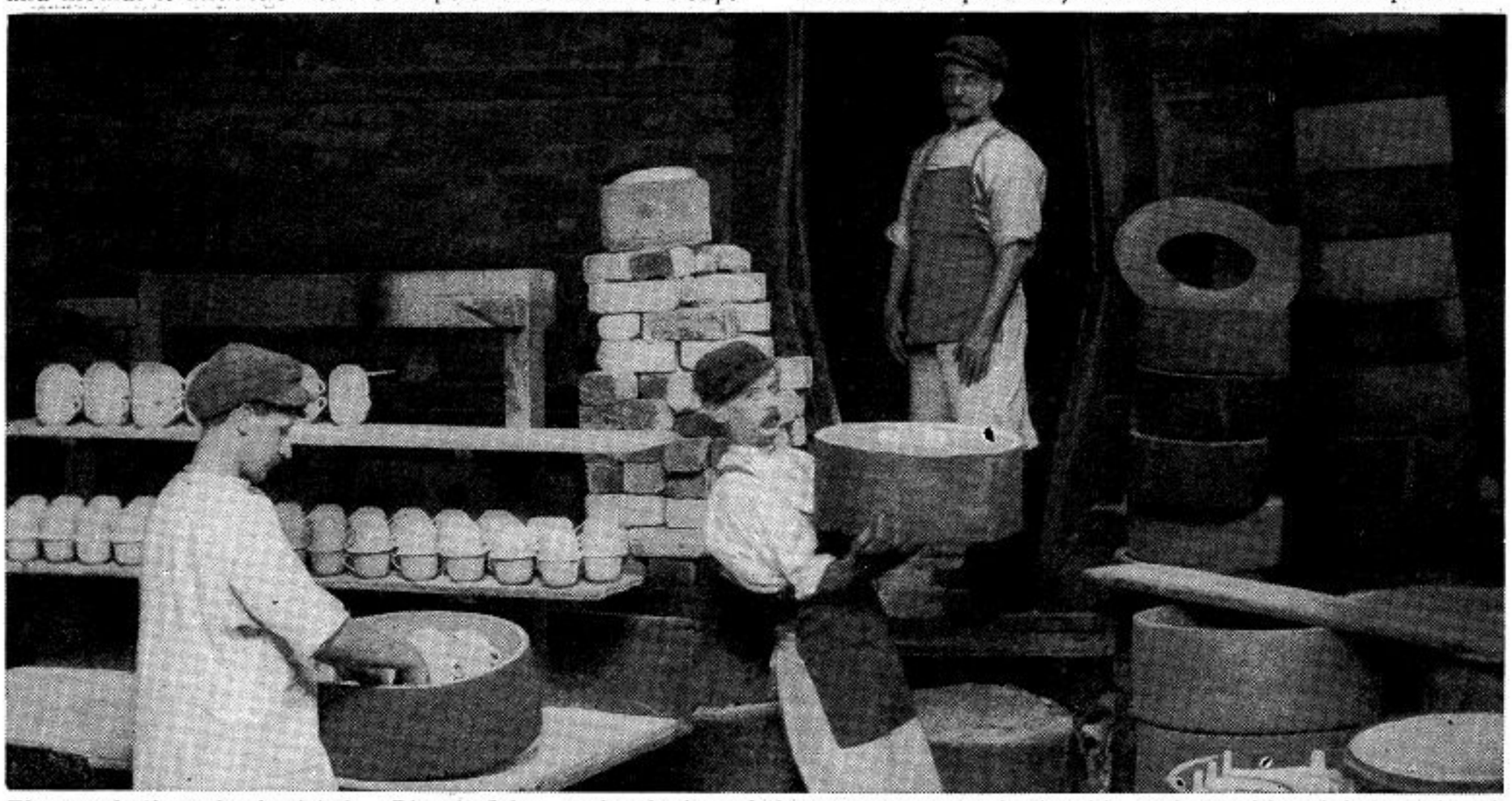
A BALL OF CLAY BECOMES A TEA CUP



The potter throws a ball of clay on to his revolving wheel and moulds it until it takes the shape of the bowl of the cup.

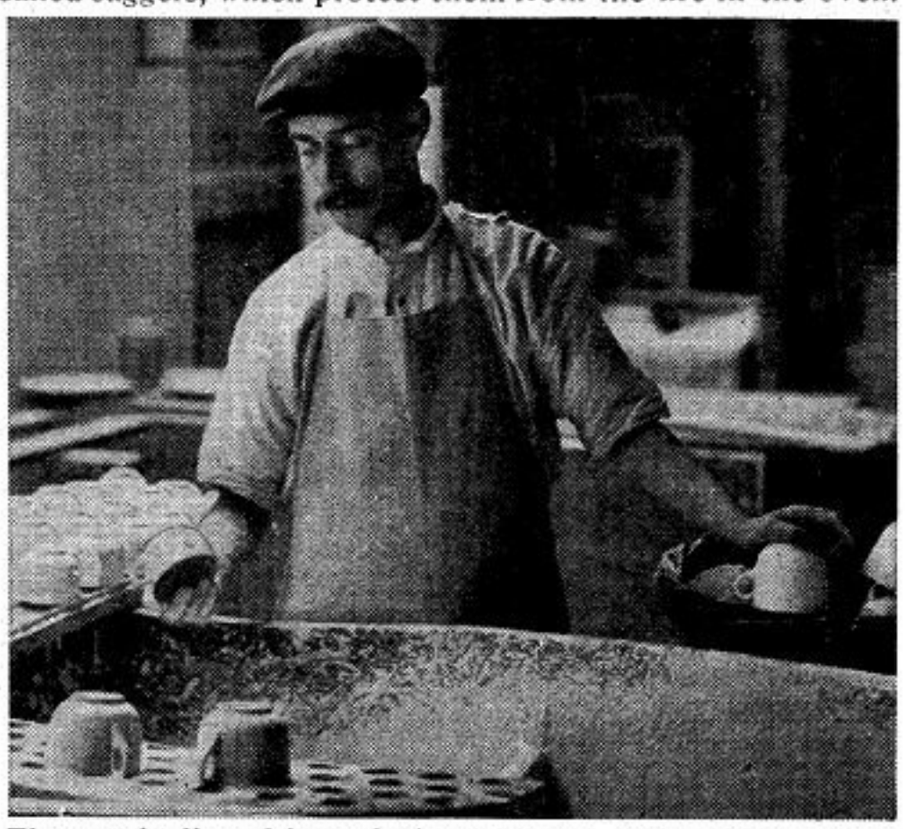


The bowl is dried until hard enough to handle and then finished and polished, after which the handle is put on.



The cup is then slowly dried. Biscuit-firing, or hardening of the ware to make it durable and capable of being glazed, then takes place. The cups are placed in round fireclay boxes, called saggers, which protect them from the fire in the oven.

The oven is bricked up, and after 48 hours the clay cup has become earthenware or china. It is then decorated by means of transfers printed on sheets of paper as shown.



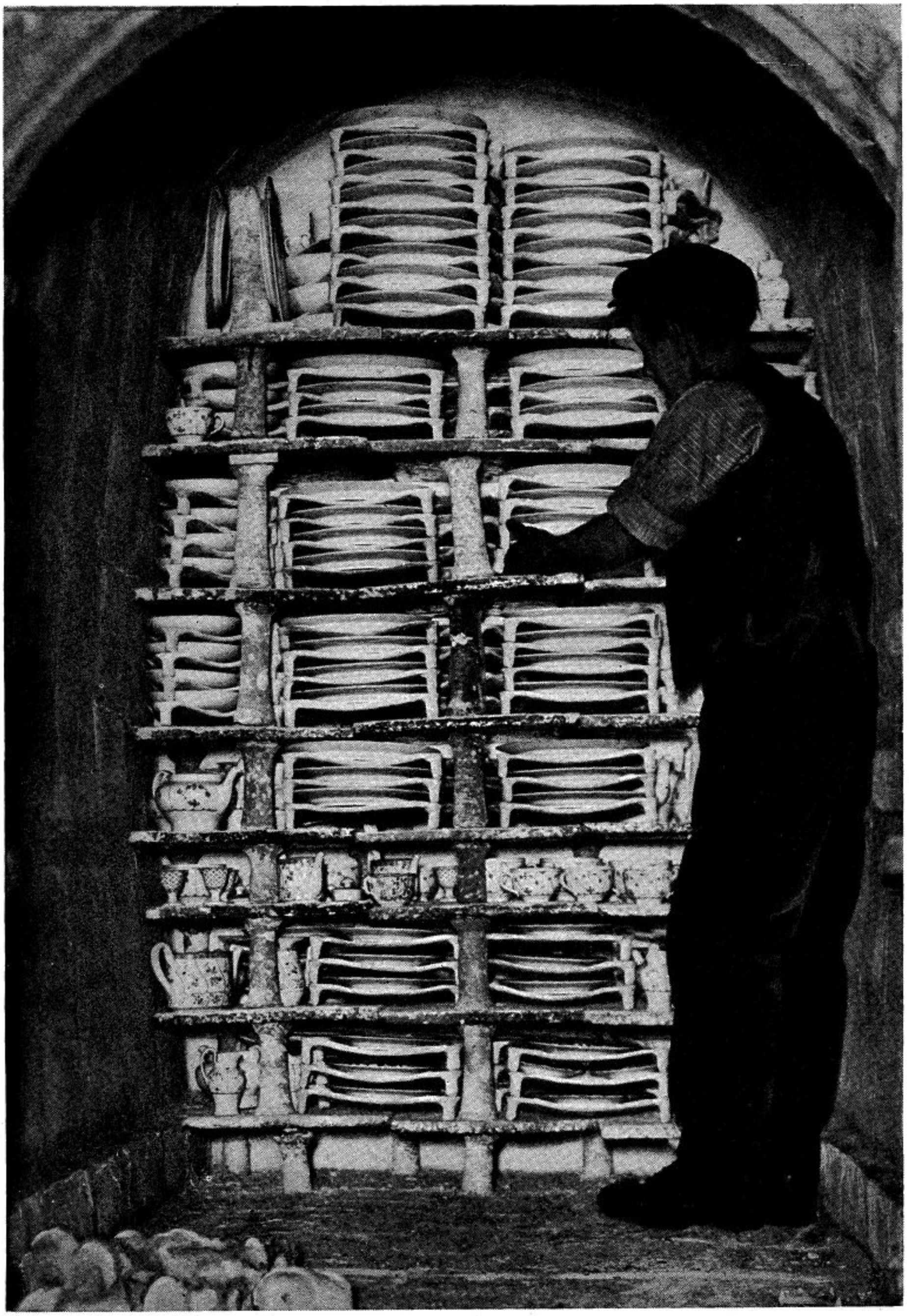
The cup is dipped in a glazing mixture, and carefully dried in a glost oven. The glaze used must contract equally with the drying china, or it will crack and peel.

HOW THE DINNER PLATE IS SHAPED

Much china is made by pressing and casting. Pressing is making hollow-ware, like soup tureens, in a plaster mould, which is removed to permit handles, feet, or spout to be added to the piece. In casting, liquid clay is poured into moulds which are removed when it has hardened. Here we see a girl stamping out small shapes from clay. •

When many articles, like dinner plates, have to be of the same size, the potter shapes them mechanically from the damp clay in the machine shown in the picture. He then carefully trims them to the exact size, and they are taken away to the drying stove, where they set more firmly before being fired in the oven.

AN OVENFUL OF PAINTED CHINA



Beautiful decorative effects may be obtained by staining clays, by painting or printing biscuit, by the use of coloured glazes, by enamels put on the glaze, and by metallic or lustre decoration. Enamel colours on the glaze are fired in a big kiln. The pottery is placed on brick or iron shelves, and kept at a very high temperature for 10 to 12 hours. Here we see a fine collection of decorated ware in a kiln for firing at Minton's potteries.

Plain Answers to the Questions of the Children of the World

WHY DOES A BALL BOUNCE?

THERE are two kinds of balls which bounce—those which are solid, like a hard indiarubber ball or a golf ball, and those which are hollow, like a tennis ball.

No matter whether a ball is solid or hollow, its bounce is due to the fact that it is what we call elastic. This simply means that when the ball is pressed out of its shape it tends to return to the shape it had at first.

We must not, however, think that only indiarubber is elastic. On the contrary, steel is much more elastic than indiarubber, and, as can easily be proved, steel balls bounce splendidly.

Into almost every question we can ask there comes, sooner or later, the greatest and deepest law of all science, which is that nothing is lost or created, and that everything has to be paid for.

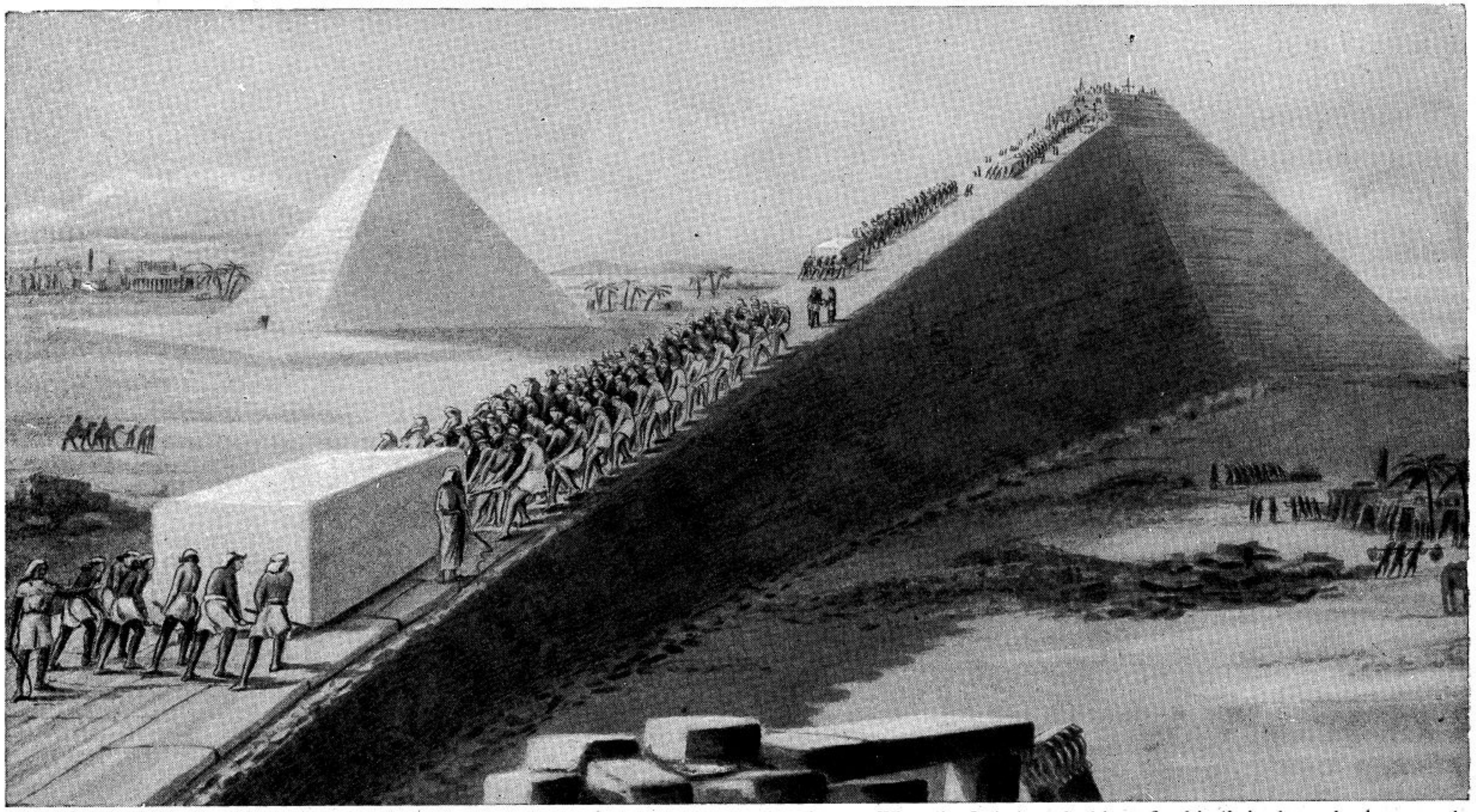
When the ball starts bouncing it has a certain amount of motion in it, which is force, or power, or energy. When it stops, that has gone. Either we must show that the energy has gone somewhere and has not been destroyed, or, according to the great law of the persistence of power, the ball should bounce for ever. If it did not bounce for ever the law would be false. It is, however, quite easy to show that the ball does lose the power with which it started. To begin with, it is moving, both up and down, through the air, and forcing millions of particles of air aside. All the motion it gives to them it loses.

If a ball were bounced in a space as far as possible emptied of air, it would bounce far longer than it does in the atmosphere, just as a top will spin longer in the same circumstances. Suppose that, instead of bouncing the ball on something hard, we bounce it on a pillow or on loose sand. It will not bounce long in such a case. Its power has gone in moving the pillow or the sand as well as the air. The ball itself, too, is not quite elastic, nor is the ground. If the ball and the ground were quite elastic, and there were no air to move, and the ball never turned and rubbed the ground in falling, it would bounce for ever.

In the case of a hollow rubber ball, it is not by any means the indiarubber only that explains why the ball is so elastic. The ball is filled with a mixture of several gases, which we call air. We can see how much this ball bounces if we compare an ordinary soft indiarubber ball with another one which has a small hole in it.

The air is expelled from the hole when the ball is bounced, and we find that it bounces very little, because the elasticity of the ball is so poor. But the other ball bounces exceedingly well, because, when it is bounced, the air in it is not squeezed out through any hole, and thus gives the ball its elastic rebound.

HOW THEY BUILT THE PYRAMIDS FIVE THOUSAND YEARS AGO



How were the Pyramids built ? We are almost sure that they were built as shown in this picture. When the first stones had been fixed in their place a bank was made up to the top, sloping down to the level of the ground. Up this slope the next great stones were dragged, and as the pyramid rose the sloping way rose too, until it became a wonderful road for thousands of slaves to walk upon, dragging the stone blocks behind them. By the time the pyramid was finished this roadway must have been hundreds of yards long, and it had, of course, to be removed before the great monument could be seen as we see it today.

What is Pain, and Why Does It Hurt?

Not the wisest man can answer this question, but we know some things about it. We know that certain nerves run to the skin, and that when they are excited the result is pain—just as when the eye nerve is excited the result is sight. We know that when these nerves are damaged and cannot work, the skin cannot feel pain. Also, we know that when any other nerves are excited too intensely, the result is painful. Loud music may be very pleasant, but there is a point beyond which it quite suddenly becomes painful. Similarly, a bright light may be beautiful and pleasant, but beyond a certain point it suddenly becomes painful.

No one, however, has any idea what happens in the nerve or in the nerve-cells when this change comes, though it has lately been thought that when a nerve is very highly excited it changes in shape. This, however, does not tell us in the least why pain should go with it. No one could explain what pain was to a person who had never felt it, except by causing him pain. Similarly, you cannot describe sight to a person born blind. Words cannot describe these things, except to people who know them by experience.

What are our Eyebrows for?

This is an easy question we ought all to be able to answer, yet many grown-up people could not tell you.

There are two good reasons why we have eyebrows. One is a reason of use, and the other of beauty. In the first place, if we had none, the drops of sweat that form on our foreheads when we get warm would run into our eyes; and this would be bad, not only because it would blur our seeing, but also because sweat is really poisonous and a thing to get rid of, which is one of the best reasons for washing.

Now, our eyebrows catch the drops of sweat, and turn them aside. That is quite a good enough reason in itself, but there is another. The eyes are the most beautiful and interesting part of our faces, not only from their form, but also because they and the eyelids move so quickly, and so give the idea of life. That is why a face looks so different when the eyes are shut.

Now, the eyebrows are not only beautiful in themselves, but have the special purpose of calling attention to the eyes, just as we draw attention to a specially important word in a letter by underlining it. That is why some foolish people make their eyebrows darker than they really are; but if you have a bright and healthy mind your eyes will look nice enough without any silly help of that kind.

How Do We Know the Height of a Mountain?

It is not very easy to measure a mountain, but there are various ways of doing so. One of them is too difficult to explain here, or to anyone who has not learnt a good deal about angles, and so on, already. But there is a much less difficult way of measuring the height of a mountain, though it is not such an exact way. In order to use this way you must go up the mountain yourself, and it will, at any rate, tell you how high you have gone. People use this way when they want to know how high they have gone in a balloon. They take up a barometer, or a weather-glass, with them.

Now, a barometer is simply a measurer of heaviness; it measures how heavy the air is above it. The higher you go the less air there is above you, and so, as you ascend, the mercury in the barometer moves in a little tube according as a less weight of air presses upon it from above. If you know already how much difference it makes in a barometer to go to a certain height, then you can tell how high you are on a mountain or in a balloon. But you must use the other way, with measurements of angles and special instruments, if you want to measure the height of a mountain without climbing it.

Why Does a Pin Get Hot if Rubbed Against a Stone?

All rubbing, or friction, produces heat. If you had a really delicate thermometer you could easily prove that paper and india-rubber and the air around them all get hotter when you rub out something you have written. The motion that starts the rubbing is changed into the special kind of invisible motion called heat. In the case of a pin rubbed against a stone, we notice the heat-effect of friction particularly well. This is, in the first place, because the pin has a sharp point, which hinders easy movement on the uneven surface of the stone; and, second, because the pin is made of metal, and all metals are very good conductors of heat. So the heat runs up the pin very easily and quickly, just as it runs up a poker held in the fire, and that is why we feel it so distinctly and quickly.

How Does a Soft Cloud Make a Noise When it Thunders?

It is not the clouds bumping against each other that makes thunder. Certainly clouds are much too soft to make a noise when they do that. They are, indeed, too soft to bump at all, but simply mingle with each other. The thunder is due to the disturbance of the air when electricity passes from one cloud to another, or from a cloud to the earth. As it passes it makes the air near it very hot, and so starts a wave in it which we hear and call thunder.

Why do we Ever Stop Growing?

What we call growth is the power the cells of the body have of taking nourishment into themselves and so becoming larger, and of dividing and giving rise to other cells like themselves. This power, however, is limited, and every kind of cell can only grow within the limits of its own law—the law of growth. No matter how much food or exercise is taken, the law of growth prevents any number of cells becoming more numerous or larger than a given limit. When the body is young the growth is very active, but as the body grows older the limit of growth is gradually reached, and growth stops.

Do Animals Talk to one Another?

People used to think that only human beings could talk to each other, and there is no doubt at all that no other creatures can talk one thousandth part as well as we do. But no one who knows animals now doubts for a moment that many kinds of animals can talk to each other—only they do not use our kind of talking.

Monkeys, for instance, make many kinds of sound with their mouths which have different meanings; only they do not express ideas or make assertions that the earth is round, but they express their feelings. A baby expresses various feelings with its mouth long before it can talk, and so many animals can express fear, joy, anger, and many other feelings with their voices, and their fellows can understand them. That is talking of a kind.

But though monkeys probably come nearer to us in talking—though still very, very far away—than any other animals, many insects, which are very simple and humble creatures compared with monkeys, can talk wonderfully in their own way, especially the social insects, like ants and bees and wasps. If they could not tell each other what they felt and wanted, they could not live together in societies as they do—societies, remember, from which human beings have a lot to learn yet, societies in which very few children die. The insects have long "feelers," with which, as it seems, they can touch each other, and say what they want to do or how they feel.

How Does the Stone get in the Plum?

This question is answered if we watch what actually happens in Nature.

A plum is the last stage of a long series of changes that happen in the flower of the cherry-tree or the plum-tree. After these flowers have been fertilised—which means made fertile, or capable of producing something—they begin to change. If we look on, we may think that the flower is dying. The beautiful petals fall off, not because any harm has come to the flower, but because the petals are no longer wanted.

Then a little hard thing with a tough skin appears, and that is really the fruit. But at this stage it consists of hardly more than the stone and the skin covering it. But there is a layer of very active cells which lie between the stone and the skin, and they produce the flesh of the fruit, for which we prize it. Birds prize it, too, and so they eat the fruit, and in so doing carry the stone away with them. If it is fortunate, it falls upon suitable ground, and begins to grow, or to germinate, as we say. The living interior of the stone, which contains the seed of the young plant, begins to grow and passes through the shell, and so a new tree begins to form. It was for this that the flowers were made.

How Does Still Water Reflect a Distant Scene?

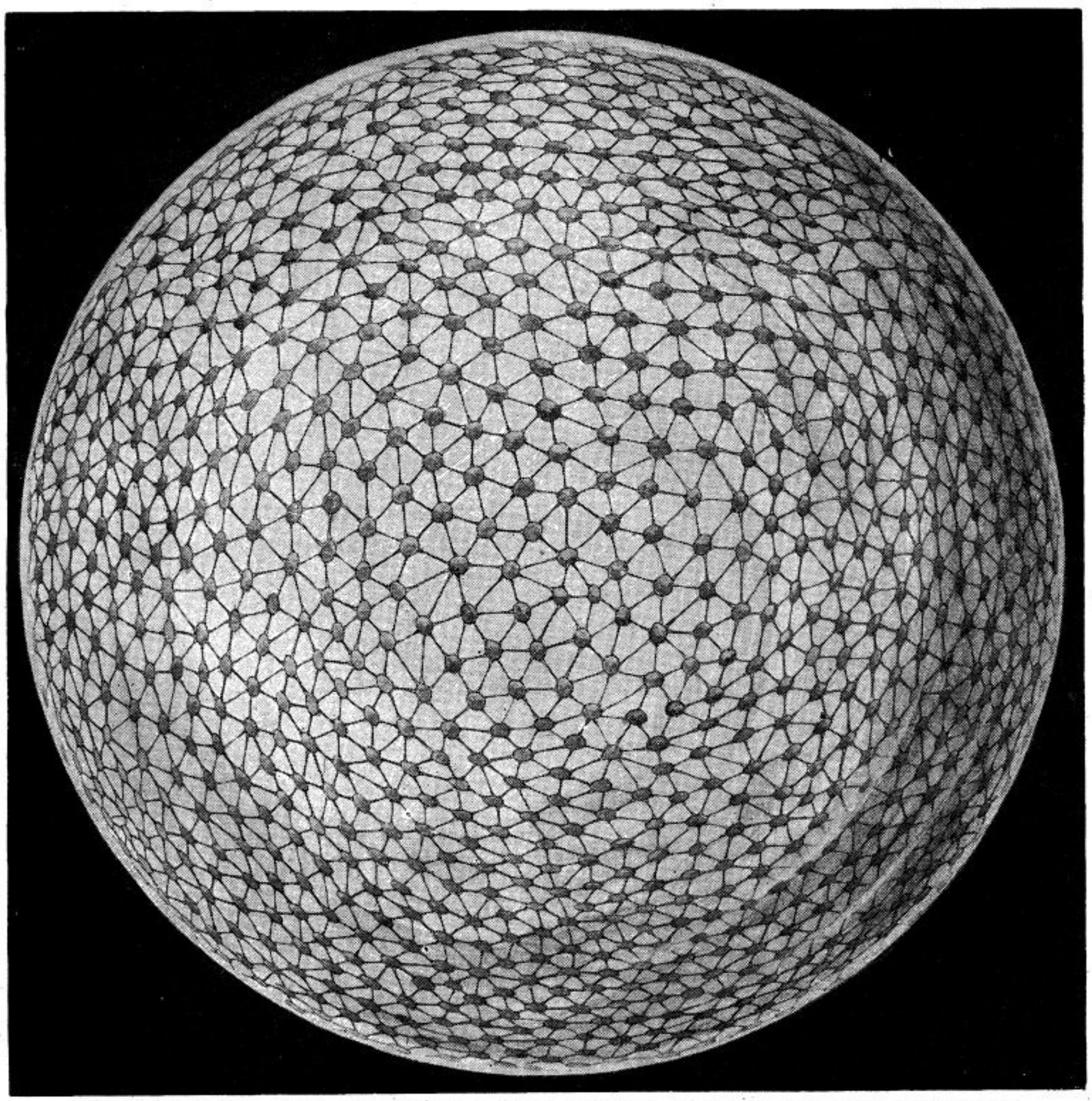
The distance from which the light comes has nothing whatever to do with what happens to it. Still water, like many other surfaces, is a very exact reflector of light. It throws the light-waves back from itself without mixing them up or distorting them. So long as it does this, we can see the image of whatever threw the light. It matters not in the least how far the light has travelled before it reached the water. We can see trees reflected in it, but we can see the moon or the sun reflected in it equally well, though they are scores of millions of miles away.

How Does a Soap Bubble Hold Together?

The tiny particles of water which make a soap bubble are held together by the force we call " surface tension."

Surface tension is a force that acts in the particles at the surfaces of fluids, and acts in such a way that each attracts each and pulls on each, and will stretch rather than separate from its neighbours. In this way the united particles come to make, as it were, a very thin elastic skin.

We see surface tension acting when we fill a tumbler of water above the brim, for the particles form a rounded skin which prevents the water from overflowing. We see it, too, in the rounded form which little drops of fluids take, for this form is made by the pull, or surface tension, of the particles. On the surface of every liquid there is such an elastic skin made by the particles there hanging on to each other, and pulling on each other, and producing such a condition of tightness or tension as we find in stretched elastic. A bubble is all surface; it is simply such an elastic surface skin stretched, by air pressure. As the air pressure presses equally in all directions, and the particles pull equally on each other the skin is blown up into a round balloon just as any other elastic skin might be. But the bubble must burst in time, for the particles which hang together, and compose its skin are subject



THE WONDERFUL WAY IN WHICH A SOAP BUBBLE IS MADE TO HOLD TOGETHER

This picture shows us how a soap bubble holds together. Of course no microscope could show us a bubble like this, but the picture gives us an idea of how a bubble is made. The molecules of water should really be infinitely smaller and greater in number than here, and the lines between the molecules are merely drawn to suggest the way in which the pull, or surface tension of water, draws the molecules together. There are not really any lines. See explanation on this page.

like other particles, to the action of gravitation. They are not only stretched by the air inside the bubble, but are pulled downward by the force of gravity, and that force is greater than the other force called surface tension. So some drops run down the bubble and the bubble becomes thinned and weakened in parts, and in the end so thin and weak that it cannot resist the pressure of the air inside it and accordingly bursts.

What Makes a Soap Bubble Rise and Fall?

If a soap bubble lasts long enough, and does not burst too soon, it will begin to come down again after a little.

The simplest explanation of this would be to remember the case of a balloon filled with hot air. It goes up, for a time, and then it comes down again. It goes up because the hot air inside it is lighter than the air round it, and, being lighter, must rise, just as hydrogen would have to rise.

When it cools, the weight of the covering of the balloon brings it down again. Now, a soap bubble is really a little hot-air balloon, for the air that fills it is warm air from our lungs, and the air is so much lighter than the air outside that it goes up with force enough to carry the weight of the water that makes the skin of the soap bubble.

But this cannot last long, for the skin of a soap bubble is very thin, and so the heat from our breath that is inside the soap-bubble soon escapes, and the bubble becomes as cool as the air around it. Then there is nothing to hold up the water of the bubble, and it begins to come down. It is interesting to know that the early experiments for ballooning were actually made with soap bubbles.

Why Do We Hear Better on Water than on Land?

Sound is composed of waves of different lengths transmitted through the air, and these waves can be interrupted and broken up by coming in contact with any obstacle, as the waves of water are broken up when they strike a rock.

On the land sound waves cannot travel far without striking against houses, or trees, or mountains, or other obstacles to their progress, and these prevent the sound travelling to a great distance. On the sea, however, or on a great lake where the surface is perfectly level, it is possible to hear for a very long distance, simply because there is no hindrance to the path taken by the sound.

Why Does a Match Go Out when we Blow It?

When a match or a fire burns, it makes a certain amount of heat. Now, it needs heat in order that it shall burn at all, and that is why we have to put a match to a fire. Once it has started burning it will keep itself hot enough to go on burning as long as there is stuff to burn and air to burn it with.

Now, we can blow a match out because we blow away the heat in the hot gases which are just going to burn, and the whole thing becomes so cold that it will burn no longer, any more than the match would before it was struck. Any fire, the heat of which is in the gases it makes, can be blown out in the same way if we have a big enough wind to do it. You must have seen the wind blow out a fire at a picnic. But the wind cannot blow out a coal fire, because much of the heat which keeps the fire going is in the glowing coal itself, and the wind cannot blow that away. We can make a match burn more quickly by blowing on it gently enough, so as not to blow its heat away altogether, but so as to keep up a brisker supply of air than if we were not blowing at all.

What Does a Worm Know?

A worm knows a great deal. It knows when to come out of the rain. When the ground becomes too sodden with moisture it seeks the upper air. It knows how to get a living and it knows how to live, as may be proved from the fact that there are far, far more worms in England, or in any other country, than there are people. It has been estimated that there are at least 140 kinds of worms.

The worm has no brain in which to store memories. Yet it has a memory, stored probably in its nervous system; and some recent experiments have shown it. Some worms were tested in a passage shaped like a T. They crawled along the upright till they came to the cross-bar of the T. About half of them turned one way and half another. Then, by putting in a mild electric current, the left-hand passage of the top of the T was made disagreeable to the worms. At first they were puzzled, but after about 200 shocks they learned to prefer the right way. Then the current was put into the other leg of the T, and this time the worms learned the error of their way in 65 times. Evidently they were cultivating a memory.

HOW AIR MAKES THE PIANO GO

This little lady is playing a pianola, bringing music from the air. The pedalling exhausts the air from the bellows, and so causes air to rush in through the holes in the paper roll opposite those on the bar. As air flows through a hole it forces a lever which presses down a key, the position of the hole deciding which key goes down. Controls under the keyboard modify the speed of the roll and give loud or soft tones.

What is a Tradition?

When knowledge of any kind is handed down from father to son, we say that it is tradition, which really means *giving across*. Tradition may be given across by word of mouth, or, in later stages of civilisation, by means of books.

It is one of the most unfortunate things in the history of the world that tradition so often gets lost, as in the case of the Pyramids, for instance. Probably tradition is quite safe so long as a particular civilisation persists, but it is always seriously endangered by conquest. Many things are destroyed when cities are captured, and so the traditional knowledge which they contain may be lost.

Why Does an Owl Come out by Night?

Quite a number of animals, and some other birds besides owls, are *nocturnal* in their habits—that is to say, they are adapted for living their lives generally during the hours of night.

If we want to understand why an animal comes out at night, or why it comes out in the daytime, we must, as a rule, ask ourselves : What is it that makes an animal active at one time of the day rather than at another ? The answer to this question is generally to be found in the search for food. So it is in the case of the owls. Owls feed chiefly upon mice and other small creatures that are active during the hours of the night, and so the owl, with its peculiar noiseless flight, due to the fact that its plumage is so soft, comes out at night in search of food. It is because of this habit that the pupils of the owl's eye are adapted for seeing at night, being made to open very widely to catch every ray of light that there may be.

Why Does a Wet Plate Get Dry if We Leave It Alone ?

This is due simply to what we call the evaporation of water, and the great fact about this is that it occurs at all temperatures. It is true that on a hot day, or when put before a fire, a plate may get dry much more quickly than otherwise, but water everywhere evaporates at all temperatures, though the rate varies according to the amount of water already present in the atmosphere.

Sometimes, whatever the temperature, we may find that the wet plate does not get dry when we leave it, and even that dry things get damp. Matches will not strike, we find, and writing-paper is quite moist. In such cases the air has been holding more water than it needed, and has deposited it on everything exposed to it. That is what happens when the dew falls, and then a wet plate laid on the grass would become wetter.

Where Does the Fog go When it Clears up Suddenly ?

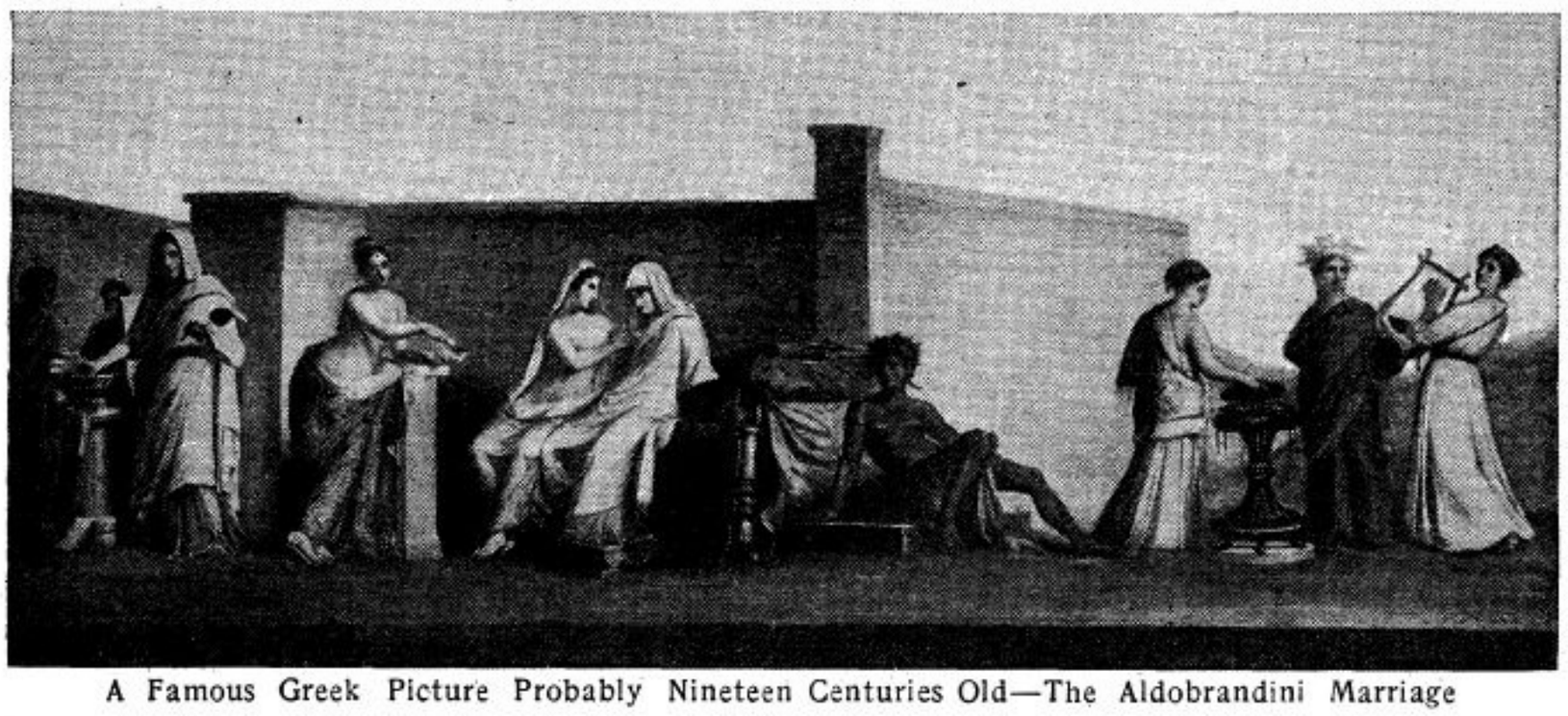
The answer to this question is not fully understood, but we know quite well what happens in certain cases. For instance, a wind, warm or cold, may come in and drive the fog before it, exactly as the air of a room where several people have been smoking may be cleared by making a draught. Or sometimes a fog clears suddenly because the air gets warmer, as may happen in various ways. A fog is only possible when the air is below a certain temperature, and if the sun, coming through clouds, or an inrush of warm air, raises the temperature above this point, the fog will suddenly disappear.

But electricity is also concerned in this question. We know that it is possible to disperse a fog artificially with great speed by means of electricity ; this has been proved by Sir Oliver Lodge. Now, electrical changes constantly occur in the atmosphere. Indeed, we are beginning to learn that they are the principal causes of the weather ; and it is very likely that sometimes when a fog suddenly disappears, as if by magic, it is because of some electrical change in the air, of the same kind as that produced by Sir Oliver Lodge's machine for dispersing fogs.

What is a Cenotaph ?

Cenotaph is an English word made up of two Greek words meaning an empty tomb, and that is exactly what a cenotaph is. It is a monument erected in honour of some dead person or persons buried elsewhere. Before the Armistice which followed the Great War the word was little used, except in learned books and by scholars ; but since the great national cenotaph was erected in Whitehall, in the heart of London, it is a very familiar word, and all boys and girls should know what it means.

When we speak of *the* Cenotaph we always mean the monument in Whitehall. These empty tombs are almost as old as architecture itself, and have been erected by men of all nations.



A Famous Greek Picture Probably Nineteen Centuries Old—The Aldobrandini Marriage

THE ARTISTS OF THE OLD EMPIRES

THERE are few things more remarkable in the history of the world than the complete eclipse of the art of the Reindeer Hunters when the Stone Age came to an end. The impulse which forced men to make those beautiful and simple pictures went out suddenly, like a candle flame.

The Stone Age, as we have seen, was a period of rough, rude existence, when wild animals supplied man's every need. The Bronze Age which followed lasted many thousands of years, and it would appear, looking at this stage of human development, that life was almost as simple then as in the Stone Age.

But in glancing back over the bounds and fields of Time as over a landscape, we see the Bronze Age in its true perspective. This slow-seeming period held nothing short of a revolution, for early during its span men discovered the use and growth of corn, barley, millet, flax, and they learned to tame animals. The world has rolled on over a hundred centuries since then, but until the dawn of steam power there has been no development so vital to human life as these apparently simple discoveries of the far-off Bronze Age. At a slightly later date men also discovered metal—first gold, then copper; some happy accident led to the mixing of copper and tin, and so the name of the mixture was given to the period. A little later again, the art of making pottery was discovered.

Many relics of daily life in Europe at this time have come to light, and they show a certain skill in decoration, but nothing that can be called art. Yet the workmen of those days knew a good deal of the technique of engraving on metal, and we can judge their skill by the decorated swords, bracelets, daggers, plaques, and so on, which have been found. The potters also made rough patterns on their bowls and dishes. And the interesting thought which arises about these is that, crude though they may be, they mark the beginning of what we might call domestic decoration. Nearly all our cups and saucers and jugs and basins today bear some design, and this habit of making useful things attractive is thus about ten thousand years old.

In addition to these small objects, the men of the Bronze Age left mysterious and huge decorated granite blocks, which they set up, generally in avenues of approach to their dolmens, or stone-built tombs. The most famous of these are on the island of Gavr'inis, off the coast of Brittany. Other examples have been found in various parts of France, in Denmark, Sweden, Spain, and Portugal. There is

one fine specimen at Newgrange, near Dublin. All bear the peculiar stamp of the Bronze Age ideal of decoration; patterns made of repeated triangles, circles, and crosses, and—in the dolmens—minute lines that follow each other much like those on sea-charts of a coast-line.

We have been unable to find out why there was nothing alive, so to speak, among these patterns of geometric lines. Save for one or two clumsy attempts at engraved figures there is no representation of human or animal life. It would seem that superstition had laid a ban on the representation of living beings.

In the meantime, it is to Egypt that we must turn for art in that distant period. While the men of the Bronze Age in our continent were making their small, skilful patterns, a great and national art was rising in the country of the Nile.

Egyptian art was immensely removed from the quality of the art of any other early nation because it was inspired by a definite system of religious thought. It is the first such art in the history of the world; it is the next big thing, in time, to the art of the Reindeer Hunters, that, as we remember, was warm and natural and beautiful, and was the work of men who had thought very little; while Egyptian art was cold and unnatural and beautiful, the work of men who had thought a very great deal.

THE TWO THOUSAND STRANGE GODS OF OLD EGYPT

The Egyptians had worked out for themselves a curious religion, a system embracing over two thousand gods and goddesses divided into certain families or groups. If it had not been for their animal worship—there were many animal deities, and numerous birds, reptiles, and insects were sacred—the religion of the Egyptians would have been lofty and rather wonderful. Some of the chief gods have interesting titles. There is Osiris, the man-god who rose from the dead, and was deified and became King of the other world and judge of the Dead; there was Set, the principle of evil, the enemy of Osiris. There was Nu, the God of the watery mass whereof the world was made.

There are the goddesses of wisdom, of literature, of Earth, sky, rain; almost every physical and mental force has its divinity in the old mental outlook of the Egyptians. Portraits of them are shown in the sacred books and paintings, and, generally speaking, from the shoulders down they are very much alike, but distinguished one from another by the most wonderful head-decorations.

These divinities imposed upon their subjects a certain way of thinking and behaviour which had for a foundation two strong beliefs—that this world is of little moment save for the passing happiness it may afford, and that the wicked are punished and the good rewarded in the world to come. It was on the idea of the future life, of which they were so wonderfully sure, that the Egyptians based most of their literature and art, and we cannot appreciate either their paintings, sculpture, or architecture without first understanding this fact.

THE OLD EGYPTIANS' RESTING ROOMS FOR THE LONG, LONG SILENCE

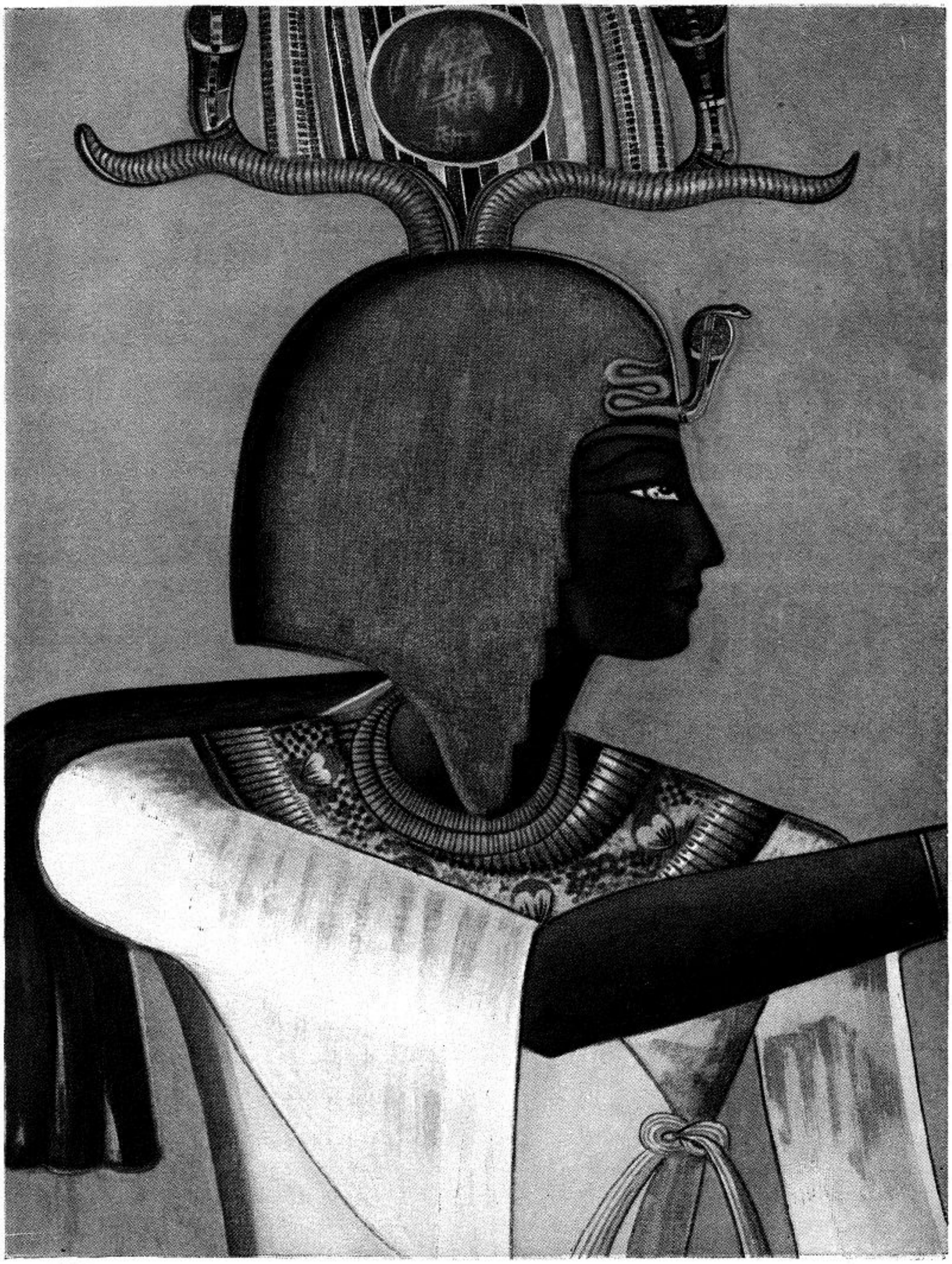
A Greek historian once said that the Egyptians looked on their houses as mere places of passage, and on their tombs as their permanent dwellings. They made tombs fit to outlast time itself, and in them buried their dead, wonderfully embalmed so that the bodies would be preserved for thousands of years; and they placed in these houses of a long silence very beautiful things. It seems strange to us that a nation should concentrate its art on its sepulchres, and perhaps we shall understand it better when we realise that to these far-off people death was only a suspension of life; sooner or later the spirit would reinhabit the body.

This idea was so real to them that they furnished the house of the dead with as great a solicitude as if the dearly-loved person had been alive; tables, chairs, stools, beautifully decorated bowls for oils and spices, painted and inlaid boxes containing mirrors, hairpins, scents, were among the furniture of the tomb. In a child's tomb they placed its toys, in that of a warrior, his spears, in that of a hunter his bows and arrows, in that of a state dignitary his staff of office.

THE LOVELY BOOK LEFT WITH THE DEAD FOR THEM TO READ

In all tombs of any importance they put a most wonderful set of writings called the Book of the Dead, which was supposed to have been written in the first case by Thoth, the scribe of the gods. It contained religious teaching, stories of the life of the gods, and so on. Each copy was separately

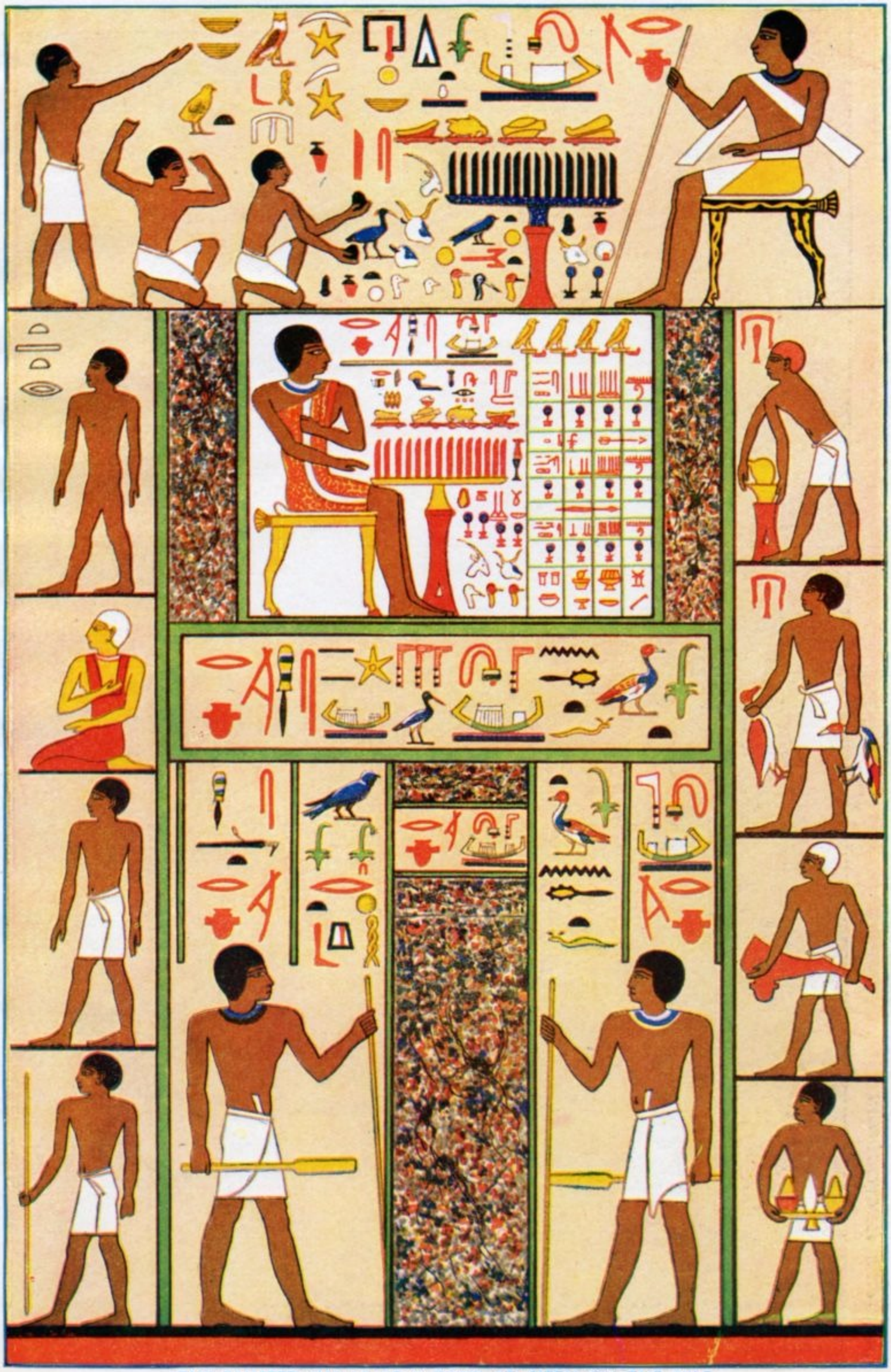
THE COLOUR OF THE ANCIENT EMPIRES



A PORTRAIT FROM ONE OF THE OLDEST PICTURE GALLERIES IN THE WORLD; KING SIPHTAH OF EGYPT. FROM THE MILES OF PAINTED WALLS AND CEILINGS LEADING TO THE TOMBS IN THE VALLEY OF THE KINGS

This fine piece of Egyptian colour was rescued in the excavations carried on at Biban-el-Muluk by the generosity of Mr Theodore Davis

A PAGE FROM THE BOOK OF THE DEAD LEFT IN THE TOMBS OF EGYPT FOR THE DEAD TO READ



THE PAINTED WALLS OF A TOMB AT GIZEH ON THE NILE

A KING'S PALACE IN ASSYRIA IN THE TIME OF NINEVEH

written and painted by scribes and artists in bright colours and hieroglyphics —picture-words; and these men put into a work which would only be seen by the spiritual eye of the dead all the skill generally put in pictures meant to win world-wide fame.

We can see the kind of illustrations that were painted in the Book of the Dead from the magnificent specimens shown in the Egyptian Galleries of the British Museum. Our collection of these papyri is the finest in the world, and it brings back to us a race and a religion and an art that will have a definite place in history as long as history endures.

THE ROYAL TOMBS THAT MADE KINGS SEEM MORE KINGLY

The tombs on which so much time and art were spent were of various kinds, the mastabas of the earlier dynasties—heavy, rectangular constructions, the pyramids of the later centuries, and the rock-hewn tombs of the mountainous parts of the country. Of these the most famous are the tombs of the kings at Biban-el-Muluk, near Luxor, on the banks of the Nile, and it would seem on entering them that death had made royalty thrice royal.

They all contained several chambers and passages, and a shaft leading to a remote chamber where the sealed sarcophagus was laid. There was generally placed in or near the tomb a statue of the dead, to which offerings were made. These tombs were built and endowed by the wealthy "for ever." In some there was generally a chamber where "the sad and solemn priests" made daily offerings for the dead. A temple built near the later tombs took the place of this room. The walls of the chambers, and in some cases the ceilings, were covered with wonderful decoration showing men and animals, gods and goddesses. Figures were often outlined or engraved, sculptured in a raised relief or a sunk relief.

WHERE THE DEAD WAIT IN QUIET HOPE OF THE LIFE TO COME

In later days the decoration of the tombs developed more on the lines of painted frescoes, and some of the chambers can only be described as gorgeous. Rows of figures were underset and surmounted by brilliant lines of geometric patterns.

The Egyptians had a curious idea in the frescoes of their tombs and temples and vignettes in their "books," and throughout the entire history of the nation it was never quite cast aside. The paint is all flat; no light and shade or modelling is attempted, and the laws of perspective had no place whatever in their backgrounds. Their figures were always wilfully "out of drawing," as we say. They showed faces in profile set on shoulders and bodies in full view. This distortion is all the more marked because the eye shown in the profile is always the eye as it would appear in a full view of the face.

Another of their peculiar conventions is shown in the position of the feet. The Egyptians as a race had small hands and long feet, and the feet were always shown flat to the ground. Any attempt at a light poise, a resting on the toes, or one foot flying, would have seemed to them a contradiction of their standards of art. After a little thought we see that it could not be otherwise. The whole spirit of Egyptian art is the clamping down of a human being on the Rock of Eternity.

THE WHITE RACES POURING FROM ASIA INTO EUROPE

The idea that they could not possibly die crept into the work even when the artist had no thought of portraying something of a religious kind. The keynote of their art, so to speak, is a quietness, a waiting, an immobility. In portraits and statues their kings and queens are often shown seated, knees together, feet together, no twist in neck or shoulders, eyes looking calmly out, the face in complete repose. If the figure is standing it is pulled out to an abnormal length, and has the same movelessness of spirit. Egyptian art, alone in the world, is intensely still.

Meantime, across the blue sea, there was another kind of art rooting itself in the soil of history, and its first seed was sown in one of the big changes of the world, like that of the coming and going of the Stone Age civilisation. About 2000 B.C. from out of Central Asia, across the tract that lies in between the Caspian Sea and the Ural Mountains, there came a race of white-skinned, fair-haired people called Aryans, and they spread themselves over Europe. They came in a succession of waves, so to speak, and one of the waves, in the fulness of time, brought the Celts to our shores. The Aryans settled in this continent and founded a civilisation which reached its highest point in Greece.

A new life sprang up about the eastern Mediterranean; there was one small part of it—the islands and coast of the Aegean

Sea, where wonderful things were made. The chief of these islands, colonised from Greece, and the centre of their life, was Crete, and her art reached a very high standard indeed. But in course of time another civilisation rose on the islands, and the work of the early artists was buried beneath sand hills and new towns.

We should know very little about it all were it not for the work of Dr. Arthur Evans, Keeper of the Ashmolean Museum at Oxford. About 1900 Dr. Evans began excavating in Crete, and he astounded the world by his discoveries. He has given to the island a proud and important place in art.

THE WONDERFUL PALACE THAT WAS LOST TO HISTORY

Near Candia, on the site of the ancient town of Knossos, he has laid bare the wonderful palace where the fabled King Minos lived, to which the Greek legend gave the name of Labyrinth. Italian archaeologists have since unearthed another palace at Phaestus, another ancient Cretan town.

The palaces are built on a very intricate plan, and show a tangle of rooms and corridors where strangers might very easily lose their way.

These royal houses were adorned with a wealth of beautiful things, chiefly plaster reliefs, painted frescoes, and pottery. The wall paintings show a wonderful freedom and vividness in their treatment. All sorts of subjects are painted on these frescoes, and when we realise how new was the culture of the islanders we can but look in amazement on the work.

The artists were of a fresh, pliant nature, and went from one subject to another in a cheerful, unbiassed way. They painted landscapes, towns, ladies on terraces, scenes of royal life, pictures of the chase. A great treasure among our discoveries at Crete is a heavy stone vase sculptured to show reapers in a kind of triumphal procession bearing heavy sheaves on their shoulders.

THE HAPPY PEOPLE WHO LEFT CHEERFUL PICTURES OF THEIR LIVES

The Cretan artists—they are sometimes called Minoan, from the ancient king's name—were skilled makers of pottery, and they painted vases in floral designs in orange, red and white on a polished black ground. The Cretan vases, and those of Cyprus, were forerunners of the famous Greek vases.

The artists of the islands also made dainty carved and cast tablets in marble and bronze. We can imagine them a happy, sun-kissed people, pleasantly occupied in painting whatever came to hand.

Troy is another legendary town which was buried and has been brought to life again near Hissarlik on the Dardanelles. Lovely little ivory tablets and figures have been found in the ruins, beads and jewels which the ladies wore, ornaments that decorated the houses sacked by the Greeks in the Trojan wars.

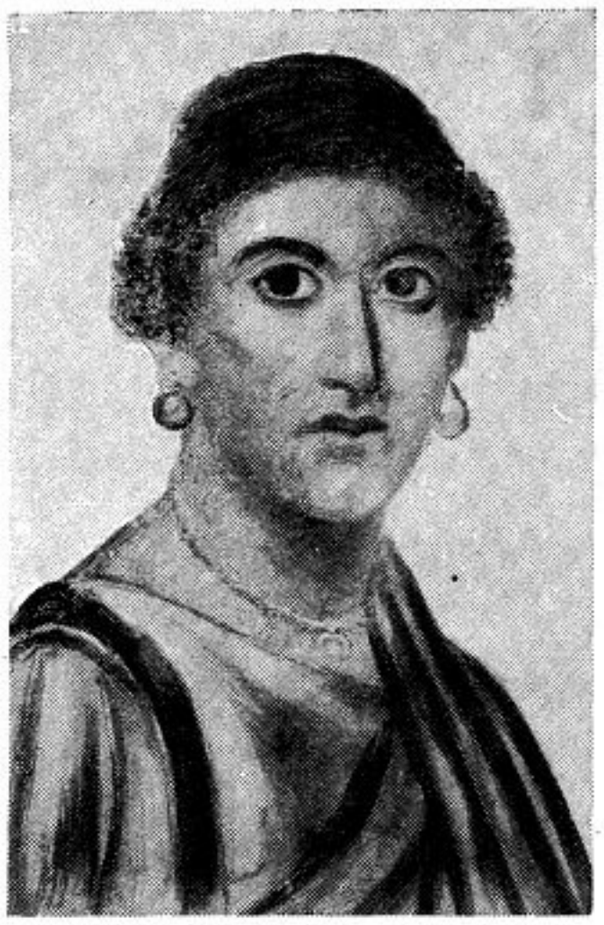
People who are interested in beautiful things ought to be very glad they are alive now, for no one knows how many more treasures will be dug out of the past before another ten years have gone by. In the meantime, in continental Greece, on the site of ancient Mycenae and Tiryns, archaeologists have found more works of art that belong to the early days of that famous nation—some wonderful wall paintings and vases. A fragment of painting on plaster from Tiryns shows in itself how wild and free was their work. It is a picture of a hunter either vaulting over a galloping bull, or, lightly poised on knee and toe, riding the heavy beast. There is something in the look of the bull that reminds one for the first time since the Stone Age of the art of the Reindeer Hunters. We can only wait for time to show if there is any link between this new and old of the far past.

THE GREEKS WHO MADE BEAUTIFUL EVERYTHING THEY TOUCHED

Crete, Mycenae, and Cyprus have given their name to a group of the famous Greek vases which made a kind of art of their own on the Eastern shores of the Mediterranean. Looking back on the minor art of vase making, one is newly amazed at the wealth of Greek genius. All the world knows the grandeur of their statuary and it would seem that the gift of sculpture alone was sufficient to make Greece famous for all time. But it is clear that the Greeks could not touch anything without making it beautiful.

Like the Egyptians, they buried a great many articles with their dead, and these, found in the tombs in an almost perfect condition, are an astounding revelation of the high standard that obtained among jewellers and potters. The burial places in Greece, Asia Minor, Southern Russia, and Etruria have yielded

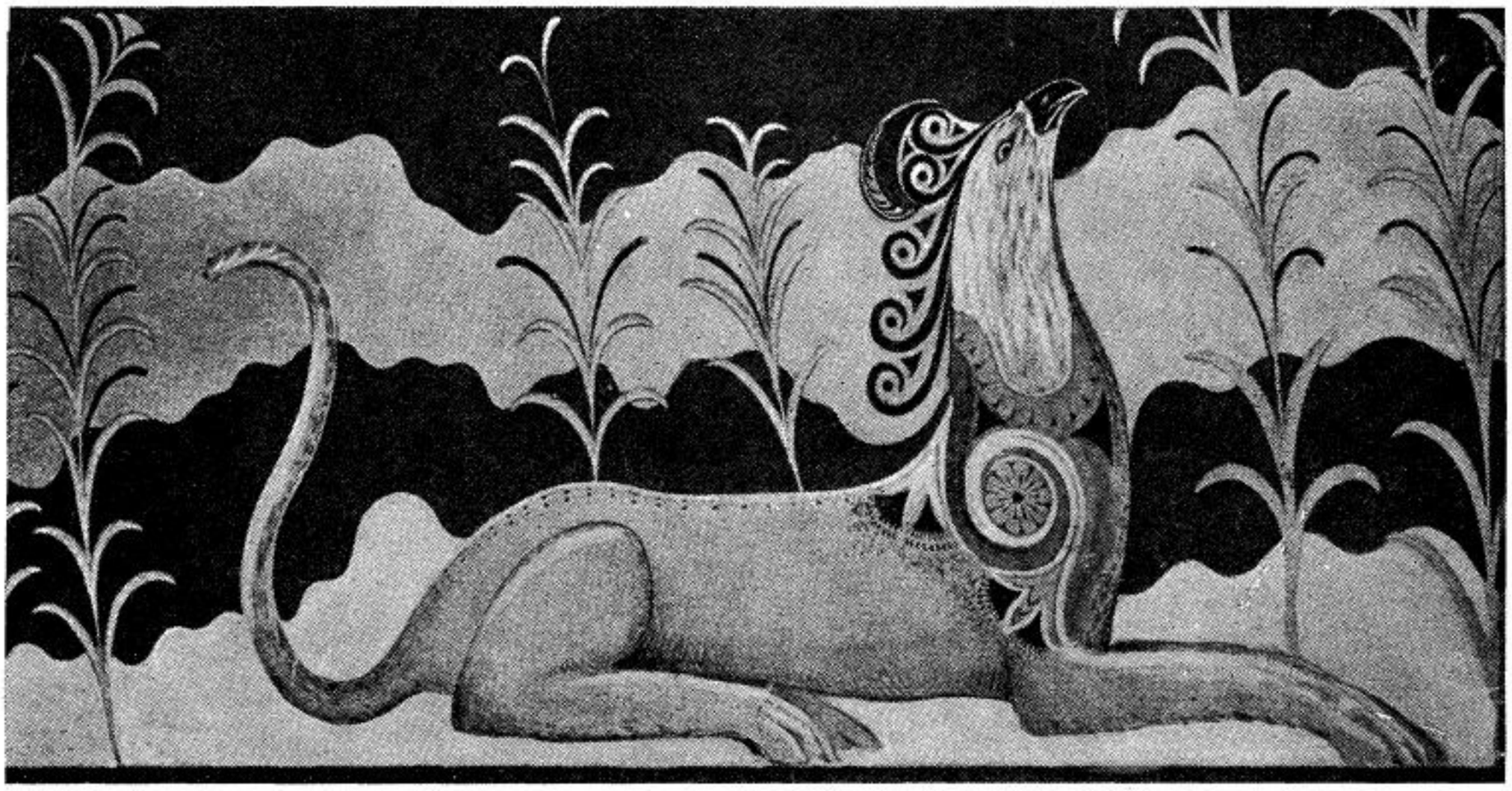
PICTURES THOUSANDS OF YEARS OLD



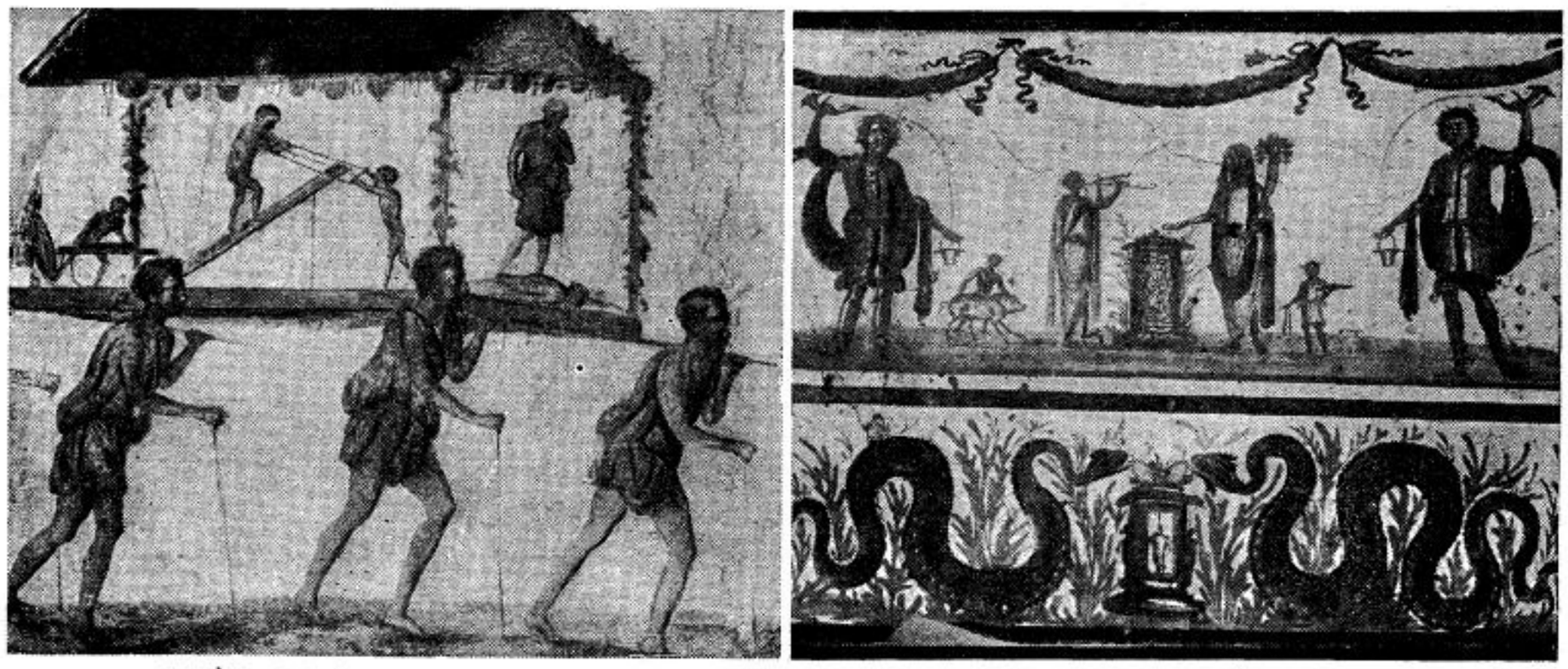
A ROMAN PORTRAIT
THOUSANDS OF YEARS OLD

A GREEK VASE IN THE
BRITISH MUSEUM

A MUMMY PICTURE FROM
OLD EGYPT



A FRAGMENT FROM THE WALL OF THE THRONE ROOM AT KNOSSOS IN CRETE



WALL PICTURES FROM POMPEII BURIED IN THE EARTH FOR 18 CENTURIES

a veritable harvest of these beauties ; gold and silver vases so costly that had they not been buried with the dead, they must have been bartered for gain long ago ; vessels of glass, beautiful jewellery, and hundreds of terra-cotta vases and tiny figurines. Of the small figures there is a very fine show in the wall cases of the Terra-cotta Room in the British Museum.

DAINTY FIGURES THAT HAVE DANCED ON VASES THROUGH 3000 YEARS

They must have been " turned out by the dozen " by Greek artists, yet no two are exactly alike, and each one is fresh and vibrating with life and a sense of great art. They show on our shelves a multitude of dainty figures which seem to go dancing, walking, loving, and talking through life. The best of them were found at Tanagra, in Boeotia, and they bear the stamp of the Great Age of Greece.

When we think of the minor arts of this nation, however, we instinctively turn to the vases. Here, again, in the British Museum is a carefully arranged collection, and we can see the wonderful pottery advance from the early Cretan and Mycenaean ware to the last of the vases made in Greece when her " beauty eye " was a little dimmed.

The shape of the vases altered as time went on. The finest are the most simple, and have the severest handles. There are, roughly, about a dozen types, and we can see them—labelled " Set of vase shapes," in the room of Greek and Roman life. This set acts as a key to the great array of pottery in the vase rooms.

The uses of the vessels were as varied as their shapes. Some are drinking-cups, some jugs, some are bowls for mixing, others are jars to hold oil.

THE CHANGING COLOURS THAT COUNT THE TIME FOR US

The ornament, like the shape, varies with the passing centuries and mirrors the rise and fall of Greek art. The free, flowing decorations of Crete and Mycenae, which belong to about 1500 B.C., gave way in the course of five hundred years or so to a kind of very stiff, geometric pattern with conventional figures in keeping with the designs. A very famous set of vases belongs to this period, jars on which are painted naval battles and funeral processions. They are called Dipylon vases, from the Dipylon (double-gate) cemetery at Athens where they were found. These were followed, about 700 B.C., by a class of vase called Corinthian, where the ornament is of another style, more florid and less severe. In them reddish-brown figures with white and black relief are painted on a light yellow ground.

After the Corinthian vases came another style of painting—black figures on a red ground. Then, about 200 years later, the ornament became red on a black ground. There are some very fine designs on the Athenian vases of this time, and a few of them are signed by the artist. The names of the chief of these vase painters are Euphronios, Brygos, and Douris. About 200 years still later came the end, where the pure terra-cotta vases were concerned. A period of imitation followed, as is always the case when an inspired art dies out.

Unfortunately very few specimens of Greek wall painting have been preserved for us, and that is one of the reasons why we treasure the vases which show the wonderful technique of brush drawing.

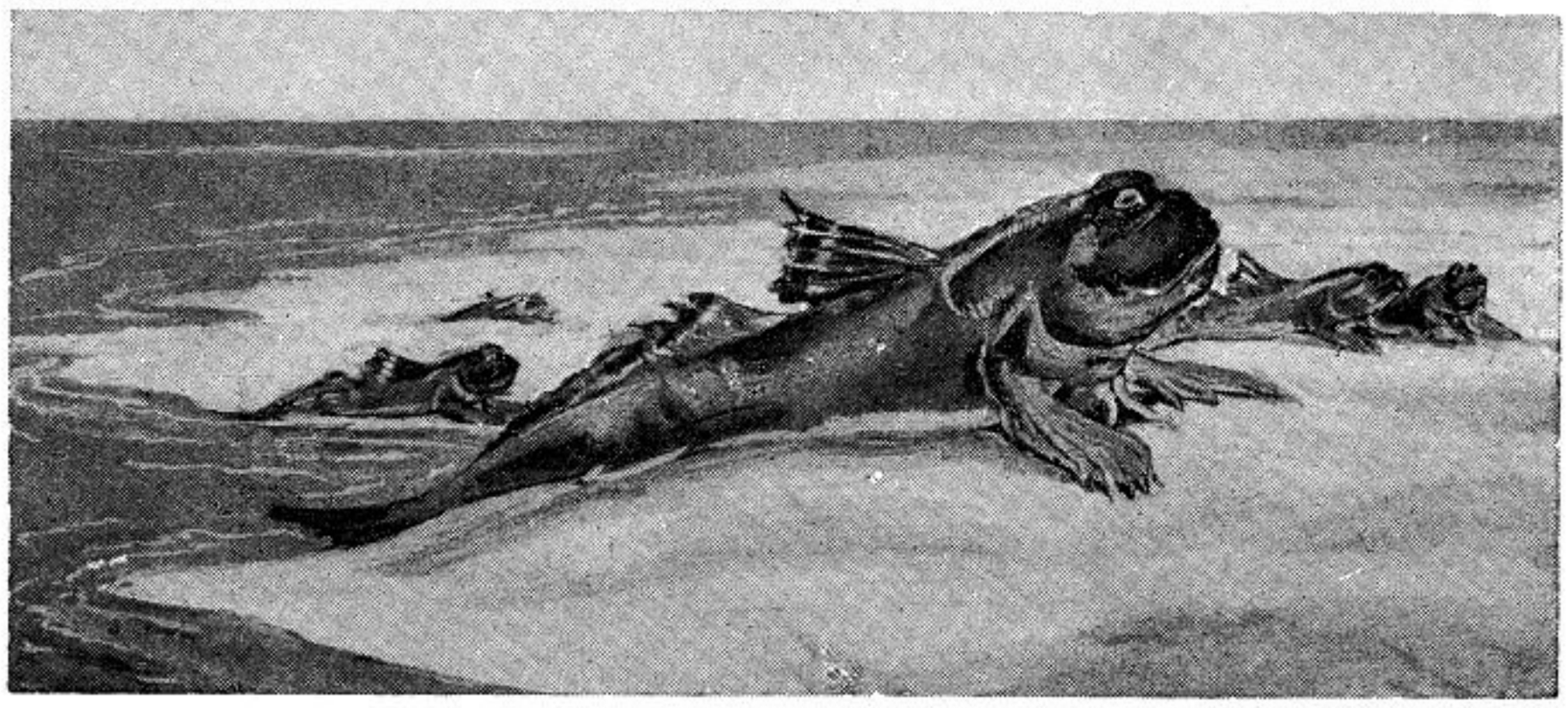
THE DYING LIGHT OF GREECE KEPT BURNING IN POMPEII

We can only guess how great the pictorial art must have been from a famous painting called " The Aldobrandini Marriage," which hangs in the Vatican Museum in Rome. There were innumerable frescoes painted by the Greek artists and their scholars, but all except those of a late period have perished. Some few were found in Egypt, and eleven of them are in our National Gallery. The rest we mainly owe to the excavation of the buried towns of Herculaneum and Pompeii, which were buried beneath a volcano eruption in A.D. 79 and discovered about the middle of the eighteenth century.

These two towns were by no means the home of what we should call Greek art of the high order, but they were freely and lavishly stored with art treasures executed under Greek influence. The paintings are chiefly compositions dealing with Greek mythology. There is an ancient Judgment of Paris, which has inspired many later pictures ; another is " Achilles recognised by Ulysses." A great many of these frescoes were done by the Roman scholars of the Greek masters.

Some of these paintings make us realise what the great work of the Greeks in their prime must have been. But the great fire of their genius had burned down, and here we see it going faintly by in thin flames.

The Wonderful House We Live In, and Our Place in the World



WHY LIFE LEFT THE SEA

We know for certain that there was a time in the story of the Earth when there was no life whatever, because the Earth was far too hot for any living thing. Now, in our story of life, which leads up to the story of our own lives, we have plainly to make a beginning at that very time when life first appeared on the Earth, which, up till then, had shown no life at all.

The story of the origin of life and of the nature of the first living things is a most interesting romance, but at present we are trying to tell in the shortest way the different stages of life upon the Earth, and we need remember only that the first living things must have been plants, because, being the first living things, they had nothing but the simplest kinds of food to live on, and it is only plants that can live on the simplest kinds of food.

As the ages went on the first living things gave birth to many more, and of these some differed in many ways from their parents, so that the seas would hold not only many living creatures, but many different kinds of living creatures; and among these certainly appeared the first forms of animal life.

Now at one time or other something very remarkable must have happened. Living creatures, born and bred in the sea and needing liquid water for their life, must actually have dared to leave the water—a very brave and big thing to do.

Life *swam ashore*. Now, we put it in that way because perhaps it will help us to remember; but this great event did not happen exactly like swimming ashore.

It may have been the moon that came to the help of life, and that really led to making life possible upon the land, for the moon makes the tides, and it may have been the tides that made it possible for life to swim ashore.

The tides do what nothing else could do; they make possible the change from the sea to the land, because they prevent the change from being too sudden.

We know hosts of living creatures today that teach us this lesson. Their proper place is in the water, especially the shallow water near the shore. Very often they live on the rocks, and as the tides come and go they often learn to do without the water for a time until it returns. Can you not imagine how they might learn, so to speak, after a long time, to do without the water altogether, and so live on the land? Of course, we do not mean that they or any other living things can do without water, for all life is in water, and

though we should be drowned in the sea our bodies themselves are more than three-fourths water. But we must understand that these creatures could learn to live without being covered by water.

This step from the water to the land was really the greatest step that life ever took after its first beginning, and the reason is a very good one.

What is the real reason why life has made so little progress in the sea and so much on land? Well, before we answer the question let us remind ourselves that life *has* made very little progress in the sea. The highest kinds of living things that are natural to the sea are the fishes, and even the cleverest fishes and the biggest are very stupid and humble things. They are quite cold, like the water round them; they have scarcely any sense at all, and they will never come to anything more so long as they stay in the sea.

It is true that there are certain wonderful creatures, like the whales and the seals, whose blood is warm, who live in the sea. But, though they look like fishes, they are not really fishes but far higher, and far younger in their history. Though these live in the sea *they breathe air*, and even the cleverest whale must sometimes come to the surface to get a new supply of air. Now that is the whole point.

HOW THE BREATH OF LIFE IS CARRIED TO THE BOTTOM OF THE SEA

As we know, every living thing must breathe or die—that is to say, it must get supplies, and always fresh supplies, of the gas called oxygen. Now, the rate at which it gets and uses up oxygen decides the rate at which it lives. The rate at which it can get oxygen depends, of course, on the amount of oxygen that is there to be got—that is plain enough.

Though life began and continued for many ages in the water, it could never make any more progress in the water than is allowed by the very small amount of oxygen that water contains; just as, if you only have a very little money, and cannot make or get any more, there must plainly be a limit to the amount of spending you can do. Life in the water went on for ages and ages learning how to make the most of the oxygen that is in it; and, when it had learnt how to make the most of that, it could make no more.

The whole of the small amount of oxygen in sea water is got from the air. Thus, there is a fair supply of oxygen near the surface of the water, which is next the air, and much less down below. It is believed that the oxygen which supports life at the bottom of the oceans is carried there in streams of cold water, which were once near the surface in the cold regions of the Earth, and which, as they are carried to the warmer regions, sink down and down, carrying the necessary oxygen to the life in the depths.

HOW THE FIRST LIVING THINGS MAY HAVE COME ASHORE SLOWLY

Now, if we think about it, we shall see that the waters near the shores of the seas, which are very shallow, and which the tides are constantly spreading out into thin layers, must really be the best-off in the way of oxygen; and that is why there is so much life of so many kinds in the waters and on the rocks of the shore. We may be sure that it would be the creatures which were accustomed to a good supply of oxygen that at last would learn to "make the plunge"—only it was a plunge not into the water but out of it into the great ocean of air.

Now, while the amount of oxygen in water is so small, the oxygen in the air is actually one-fifth part of the whole air, so that the difference between water and air in this respect is like the difference between bitter poverty and boundless wealth.

So life was abundantly rewarded for the great step from the water to the land. No doubt times were hard at first, because the arrangements which do very well for breathing oxygen in water are of no use at all for breathing oxygen in air. That is very strange, yet we all know it very well, for we know that when a fish is taken out of water it dies, and though it is surrounded by far more oxygen than it has ever known before, it actually dies for want of oxygen—that is to say, it is suffocated. It has no lungs, you see, but only what are called gills, which are arrangements for filtering oxygen out of water which contains it.

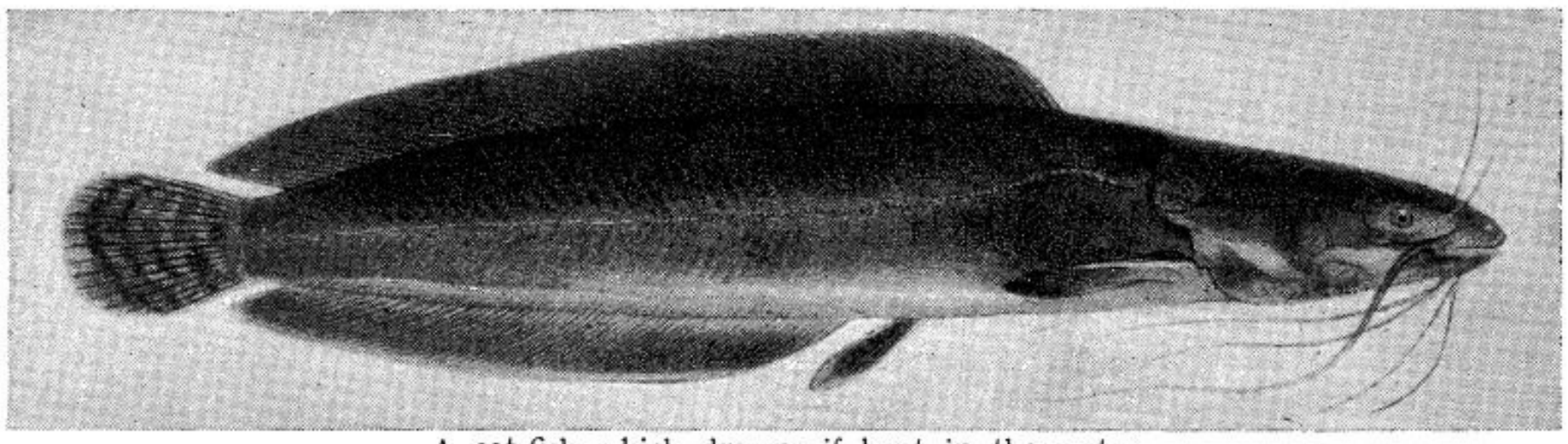
THE GREAT STEP WAS TAKEN, AND LIFE BEGAN ITS WONDERFUL MARCH

So that when life first came ashore it had to learn how to invent lungs which would enable it to use the oxygen of the air. Without them life would die in the midst of plenty, just as the fish does, dying for want of oxygen in the midst of a boundless amount of it.

This great difficulty was got over, however, in one way and another, and we have already seen how the tides came to the help of life by giving it opportunities to learn how to breathe air when the tide was out, and coming to its rescue with water when the tide was in. And so, after a long time and many failures, the great step was taken ; for, while much life remained in the water, and remains there to this day, all the great, high, and wonderful stages in the story of life came after this.

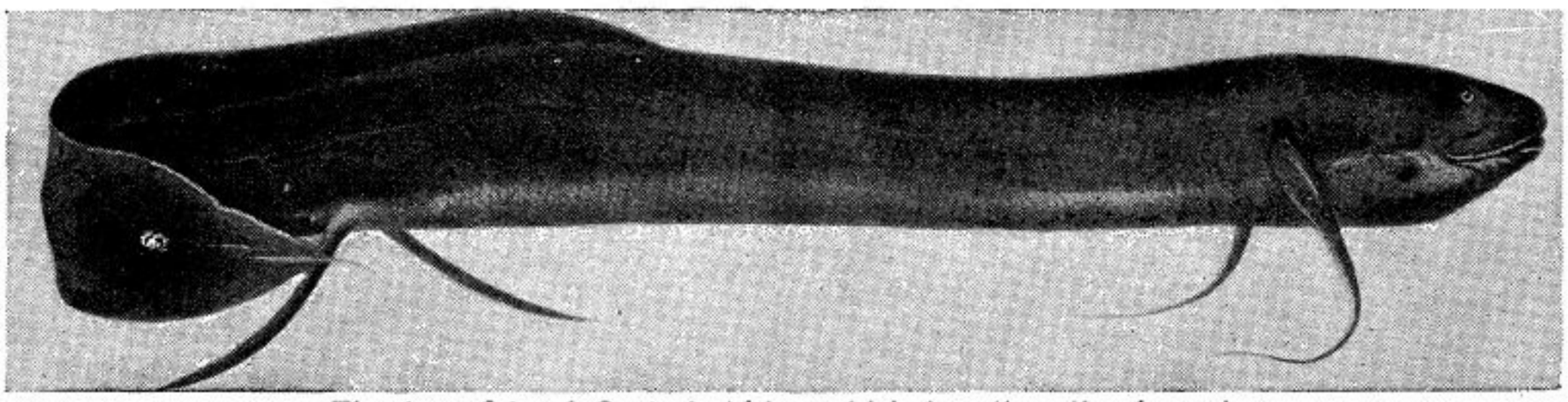
Now, when living things came to land and got abundance of oxygen what advantage exactly did they gain ? In the sea there is so little oxygen to be had that the fish cannot use any of it for the purpose of keeping itself warm. And so the fish, like other cold-blooded animals, behaves, so far as its warmth is concerned, like a piece of stone. If you have a number of different things in a room, and leave them there for some time, each of them will soon be just as hot as the others ; if now you bring a tumbler of hot water into the room, it will get cold, and the other things in the room will get a little bit warmer, though you cannot notice it. The rule is simply that the amount of heat, or warmth, in any place spreads itself about over everything, so that no one thing is hotter or colder than any other. This is the case with a cold-blooded animal, such as a fish. It is just as hot as its surroundings. If it is in very cold water, it is very cold ; and if it swims into warm water, it becomes warm too.

But now let us contrast with the fishes the case of warm-blooded animals. The fish in your hand is cold, but your hand is warm ; your whole body is warm, and



A cat-fish which drowns if kept in the water

A fish from the Congo River which drowns if deprived of air



The lung-fish of Central Africa which breathes the free air

that is why other things feel cold to your hand. The truth is that air-breathing animals can help themselves to as much oxygen as they please, and after they have taken all they need for necessaries, they can help themselves to more for luxuries. They simply light a fire within themselves and so keep themselves warm. The warm-blooded animal is hotter than its surroundings, because it is making quantities of heat inside itself with the help of the large supplies of oxygen it can get from the air. This does not mean that the animal just

makes itself as hot as it pleases—one day very hot, and another day not so hot. The great fact about the warm-blooded animals is that they are just as hot one day as the next, and as the day before, and that all warm-blooded animals are about equally hot. We might expect, perhaps, that a little bird would have a certain degree of hotness or temperature, and an elephant something quite different, and a man something different again; but when we compare the hotness of all the warm-blooded animals we find that it is about the same for every one of them.

THE FIRE WITHIN ALL LIVING THINGS IS KEPT STEADILY BURNING

The birds are generally slightly hotter than other animals, but the difference is very small indeed. It is fair to say that all warm-blooded animals live at about the same point of hotness, and this means, we may be quite sure, that *there is a particular hotness, or temperature, at which life goes on best.* When this hotness is reached and kept, all the changes that go on in living matter do so with the greatest ease and success. So long as life lived in the water, which holds only a very little oxygen, it could never hope to reach this point of hotness at which it lives best. One or two fishes have been found which are always, it seems, a little hotter than the water around them.

It was not until the great step was taken to the land, until living things learnt to breathe air and to make the most of all the oxygen in the air, that living creatures could keep themselves warm enough all the time to do the very best that is possible for them. So that the abundance of oxygen gave land life a great advantage. It is interesting to remember that, though the plant-world has covered the land as well as the bottom of the sea, it has not taken any advantage of the large supplies of oxygen in the air. It only breathes very slowly, and though some plants, like some fishes, are sometimes found to be rather hotter than their surroundings, they are never very much hotter, and never come near the point of hotness which we find in all the warm-blooded animals.

LIFE'S STEP INTO THE AIR IS NOT OF GREAT IMPORTANCE

You might think, perhaps, that yet another great step was taken when life left the land for the air, as in the case of the birds; but this is not a step of any great importance. Animals that do not fly live just as much in the air as the birds do. It is true that birds spend much of their time actually in the air, and can swim about in the great ocean of air, while we crawl about at the bottom; but, of course, the bird really lives on land just as much as we do. It does not sleep in the air, and does not make its nest in the air. The real beauty of the bird's life is that, though its home is on the land, it can soar about in the air when it pleases.

So really there is only one great step, so far as mere place is concerned, in the story of life, and that is the step from the water to the land. The bird is really a land animal, and though it can soar it never really roams from its home on the Earth.

We have spent some time in seeing why it is that the step from the water to the land was so important, and now that we have reached land we shall not have very much more to say about the life in the waters. Yet we must never forget what we said at the beginning—that life, though it has left the water for the land, can never exist anywhere, in any creature, without water.

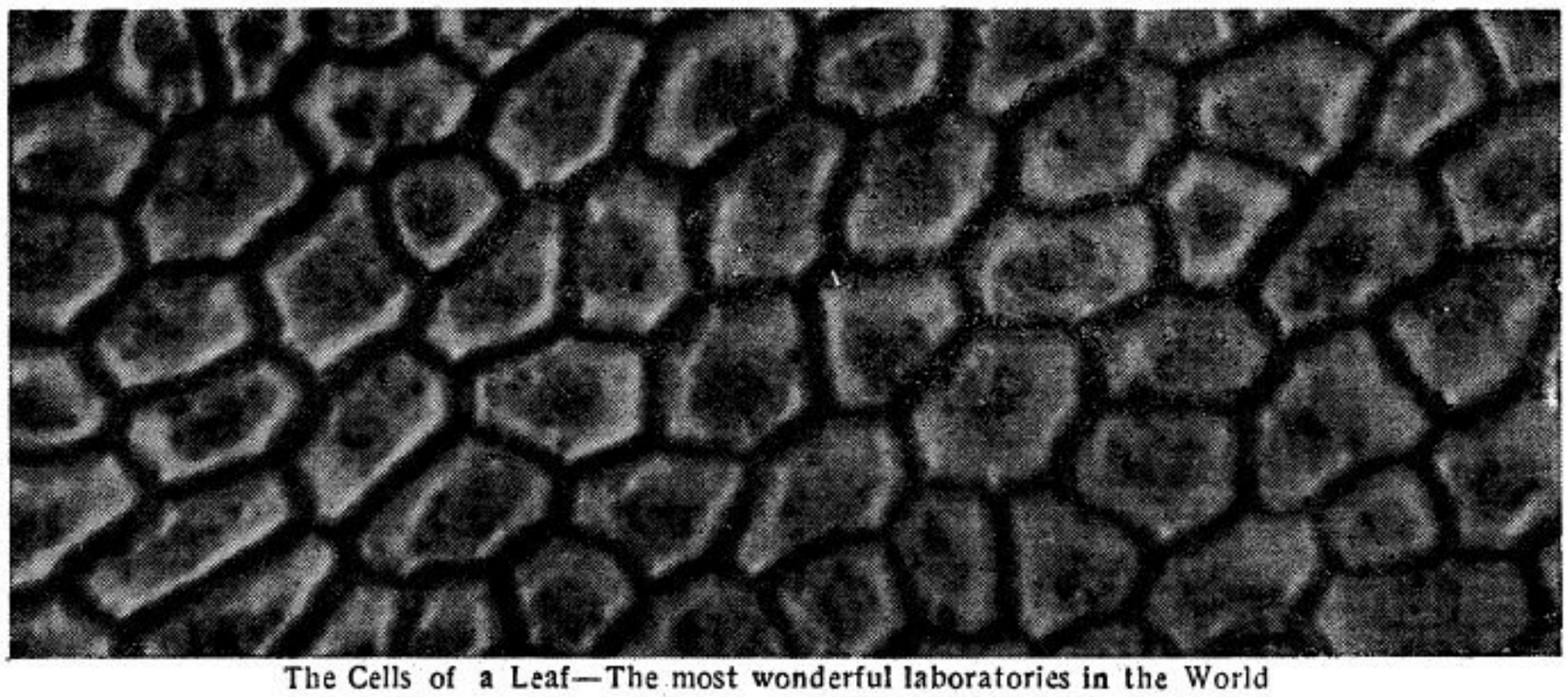
MILLIONS OF LIVING THINGS ON LAND NO BETTER THAN THE FISHES

This is true not only of animals or plants that live in water, but also of those that live in air; and it is as true of the lark soaring in the sky as it is of a flat fish lying at the bottom of the sea. When the lark goes up in the sky he takes with him all the liquid water in his body, and it is really in that liquid water that his life is lived. Take it away, and the lark must die; it is true of every living thing.

A clever Frenchman once made a study of the water contained in the bodies of animals, and he has shown that this water has in it a quantity of different kinds of what are called salts, the most important being the ordinary salt of the dinner-table. These salts are the same as are found in sea-water, and occur in just about the same proportions.

It is a most wonderful thing to have found this out, for it teaches us that, whatever life may do on land, it yet requires water very much like sea-water; and even when most of the sea is dried up, and the Earth becomes smooth with land, like our wonderful neighbour Mars, we do not doubt that life will still be needing water every hour if she is to carry on and go forward.

The Story of the Marvellous Plants that Cover the Earth



The Cells of a Leaf—The most wonderful laboratories in the World

BIRTH, LIFE, AND DEATH OF A FLOWER

LIFE is like a rhythm. There is a time of saving, and a time of spending. A period of accumulating energy—the power of doing work—is followed by a period of expenditure. There is winding-up and there is corresponding running-down in the living clock.

Probably this was established at the dawn of life, when simple creatures throve on the energy of the sunlight during the day and lived on their gains during the night. In ordinary green plants there is sunlight capture during the day and manufacture of sugars and proteins; in the darkness this stops, but there may be other internal activities such as cell-division, fermentation, and transport of material from one part of the resting plant to another.

The so-called sleep-position of many leaves, such as the clover, is very different from their position during the day, when they are busy transforming the Sun's rays into food. The life of the plant is naturally a see-saw between work and rest, but it is also in tune with the alternation of day and night.

But there is a larger rhythm in the plant's life, and that is related to the march of the seasons. In warm countries there is the sprouting, leafing, growing period of spring; the maximum industry and the flowering of summer; the fruiting and seed-scattering of autumn; and the entrenchment and rest of winter. Two ways of looking at this must be combined.

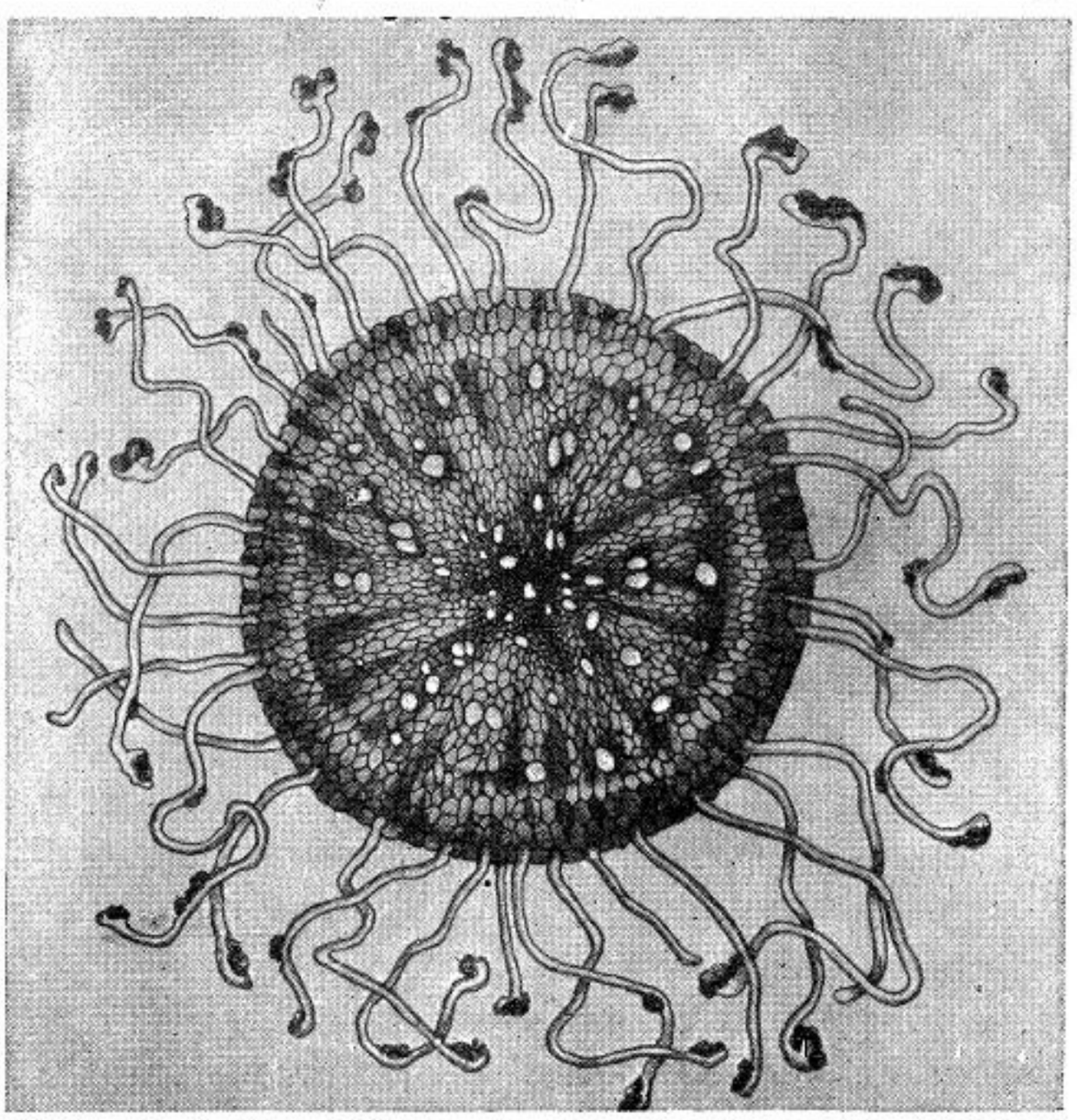
First, it is in the nature of every life to have a youthful growing time—the ascending part of the life-curve; then there is a period of maturity and great activity; then a time concerned with reproduction, or the continuance of the race; and finally there is the downward part of the curve during which activity wanes and ageing leads to death.

There are four great chapters in the life of man—youth, maturity, love, and ageing; and there are four great chapters in the life of a plant—leafing, flowering, fruiting, and withering away. These chapters depend on the nature of the organism; they are determined from within.

But the second point of view is that in warm countries there are the regular changes of the seasons; and to these the life of the creature must be adjusted. There are many annual animals such as an ordinary queen humble-bee. A young queen lies in a sleep-like rest throughout the winter; she awakens in early spring and, after visiting early spring flowers and collecting pollen and nectar, she becomes the mother of a large family. She ceases to go out of doors at all, and her working

daughters do everything but lay eggs. She usually dies in the autumn. But among her daughters there are young queens, some of them fertilised by drones, sleepy through the winter and beginning the story afresh next spring.

The point is that the chapters in the life-history are adjusted to the variation of the seasons, and so is it with the plant—with its spring foliage, its summer flowers, its autumn fruits and seeds, and its winter rest, or death. In the case of an annual, the whole life-curve rises and falls with the four seasons; when the plant lives for many years the external ups and downs have to be faced many times, and they leave their mark on each of the great chapters of life, maturity, maximum vigour, and ageing. The annual plant has its single spring in its youth; the perennial plant has many springs, and enjoys a period of youth and renewal every year.



This drawing of a section of the root of a plant shows the fine root-hairs through which the plant obtains nourishment from the soil. Particles of earth are seen clinging to the root-tips.

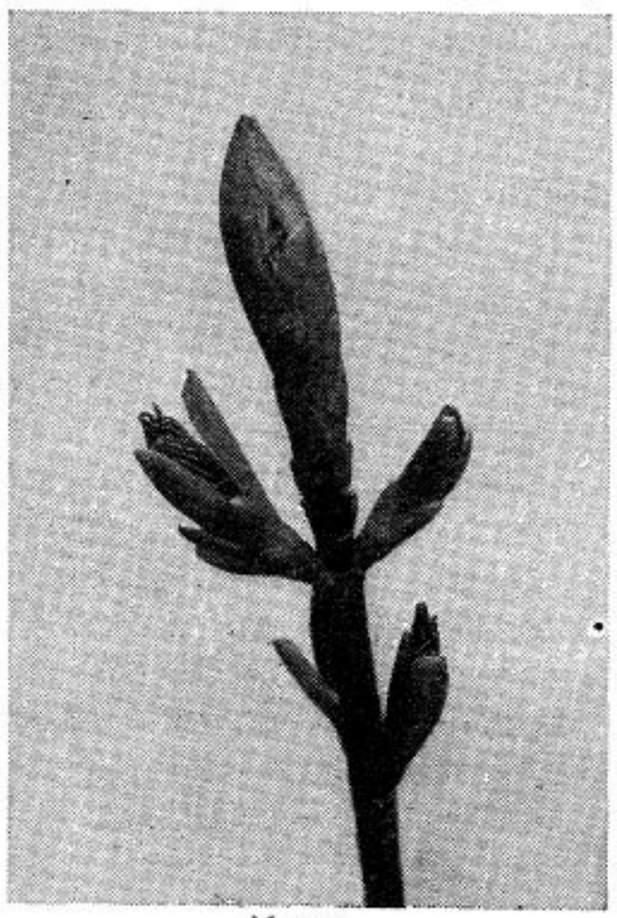
Spring is the season of young things, and we see this in the crowds of seedlings that rise from the ground. The seeds were formed in the sunshine of the previous summer; they were scattered and sown in various ways in the autumn; they have lain dormant in the ground through the cold and storms of winter. But the waiting has not been a mere marking time; there have been preparations within the seed itself.

Towards the end of winter, if we unearth some of the seeds in the ground, we find that their protective envelopes have been weakened by rotting. Bacteria help in birth. As the spring showers moisten the ground and the water soaks into the seeds the living matter re-awakens, and this is helped by the rise of temperature. The stores of starch and proteins in the seed are fermented and made more available for the young plant, which develops rapidly and bursts out. The young stem grows towards the light, and, rising above the surface, moves round and round, bending and bowing to the different points of the compass. The young roots grow downwards and they also move in the cavities in the soil. The first leaves are expanded in the light and air, and when they are thickly sown there is often keen competition among neighbour seedlings.

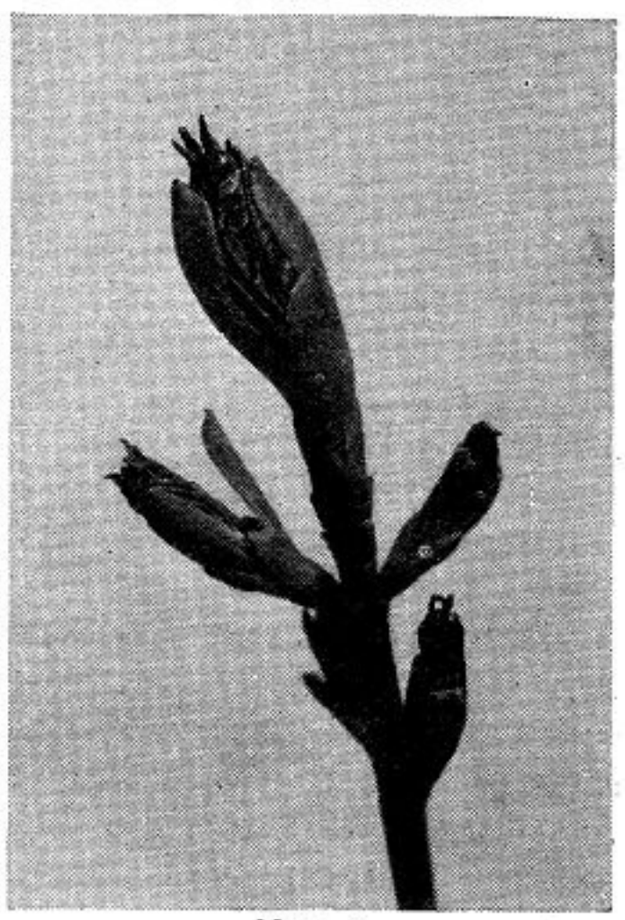
Another feature is the opening of the leaf-buds. They, too, were formed in the plenty of the previous summer. They are young shoots with closely packed young leaves — well wrapped up in tough bud-scales, often varnished with resin—which keep out the cold and the damp during the winter. The spiral arrangement of the young leaves inside these protective coats allows many leaves to be economically packed away in a small space. The spiral arrangement in the bud corresponds to the spiral arrangement of the full-grown leaves on the branch or stem, and there it has the advantage of lessening the risks of the over-shadowing of one leaf by another. It will be understood that the full-grown shoot is due to the lengthening-out of the minute axis in the core of the bud. The two main triggers that set a-going the activity of growth within the bud are the rise of temperature in the spring, and the ascent of sap from the stem. Living matter contains 70 or

THE LEAF OF THE SYCAMORE OPENS

April 30



May 1



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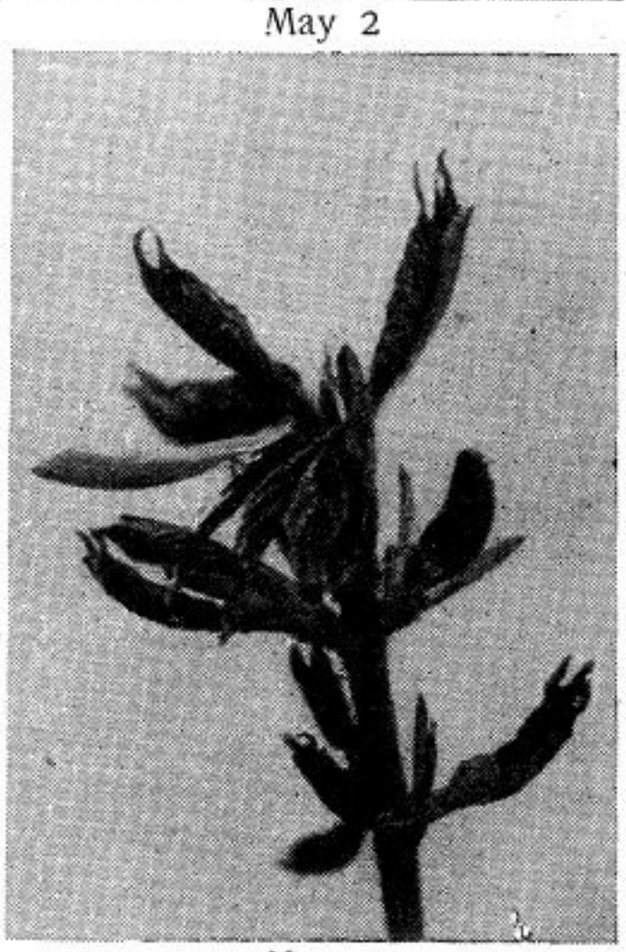

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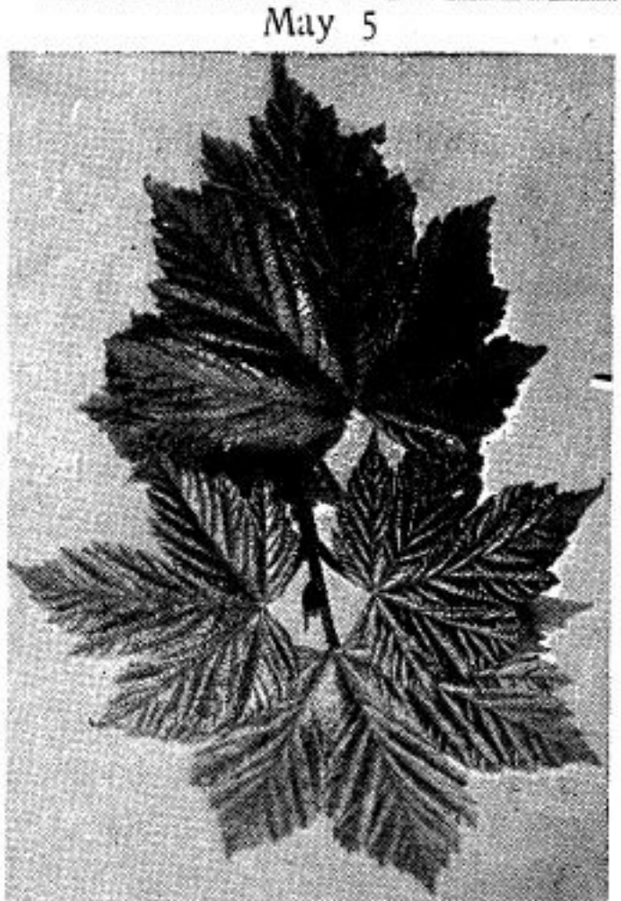


May 22

THE DEVELOPMENT OF THE WINTER BUD OF THE SYCAMORE INTO FULL LEAF

more per cent. of water, and the increase in the amount of living matter implies plenty of watery sap.

If we look in spring at a cut surface on a birch-tree, where a branch has been lopped off, we see that it is very wet. This is an overflow of the sap which is ascending from the roots. It is possible, by inserting a tube into the young wood of a tree like the maple, to show that the sap rises with considerable pressure, and this pressure has often been measured. This ascending sap, which comes up from the roots through tiny tubes in the young wood, consists of soil-water and dissolved salts. It is necessary for the re-awakening and growth of the buds, and for the manufacture of carbon compounds in the sunlit leaves.

THE WONDERFUL AND DIFFICULT PROBLEM OF THE CLIMBING SAP

We cannot give a short answer to the question: What causes the ascent of sap? but the two most important factors are root-pressure and the breathing-out of water-vapour from the leaves. The soil-water passes by diffusion through the surface of the rootlets into the concentrated sugary fluid of the living cells. As a cell receives fresh supplies it must pass on its surplus water to another cell, so enabling itself to absorb more water from the soil.

So the water passes with considerable pressure up the stem from cell to cell: perhaps it brings to mind the way firemen used to pass buckets of water from hand to hand. But then there is a supplementary process, working from the leaves backward and downward, for the using up of water in the leaves, and the loss of water-vapour into the air, must make one cell more dense than another, so that it is able to draw on its neighbour. But it is a difficult problem—the ascent of sap.

THE POLLEN-GRAIN THAT STARTS A NEW FLOWER ON ITS WAY

As we have seen, summer is the time of the plant's greatest activity, when foliage is at its best, when there is the richest supply of sunshine, and when the process of splitting up carbon dioxide and building up carbon compounds is at its height. There is an enormous chemical industry going on, though all is so quiet!

But no one can fail to associate summer with flowers. Although there are many flowers in spring, they are few compared with the pageant of summer, and they are usually, though not always, of paler colours. White and yellow flowers are common in spring; reds, blues, and purples are more characteristic of summer.

Just as the leaf is the organ through which food is taken, so the flower consists of the organs of reproduction. It was a great discovery, part of the credit of which rests with the poet Goethe, that a flower is made up of four whorls of transformed leaves. In the centre, at the top of the floral axis, or flower-shoot, are the carpels which produce the possible seeds (or ovules), each containing an egg-cell, which will develop into an embryo plant if it is fertilised by the pollen of another flower. The next tier consists of stamens, whose heads (or anthers) produce the fertilising golden-dust (or pollen), which is carried by insects or by the wind from blossom to blossom. Each pollen-grain includes a male element (or nucleus), which unites in an orderly way with the nucleus of the egg-cell when a tiny outgrowth from the pollen-grain penetrates into the ovule.

On the tier below the stamens are the petals, forming the corolla. They are in most cases brightly coloured, and they help to attract useful flower-visiting insects in various ways—by their brilliance, by their fragrance, or by producing nectar, or by several of these methods at once.

THE SUMMER-TIME WHEN LIFE IS QUICKENED EVERYWHERE

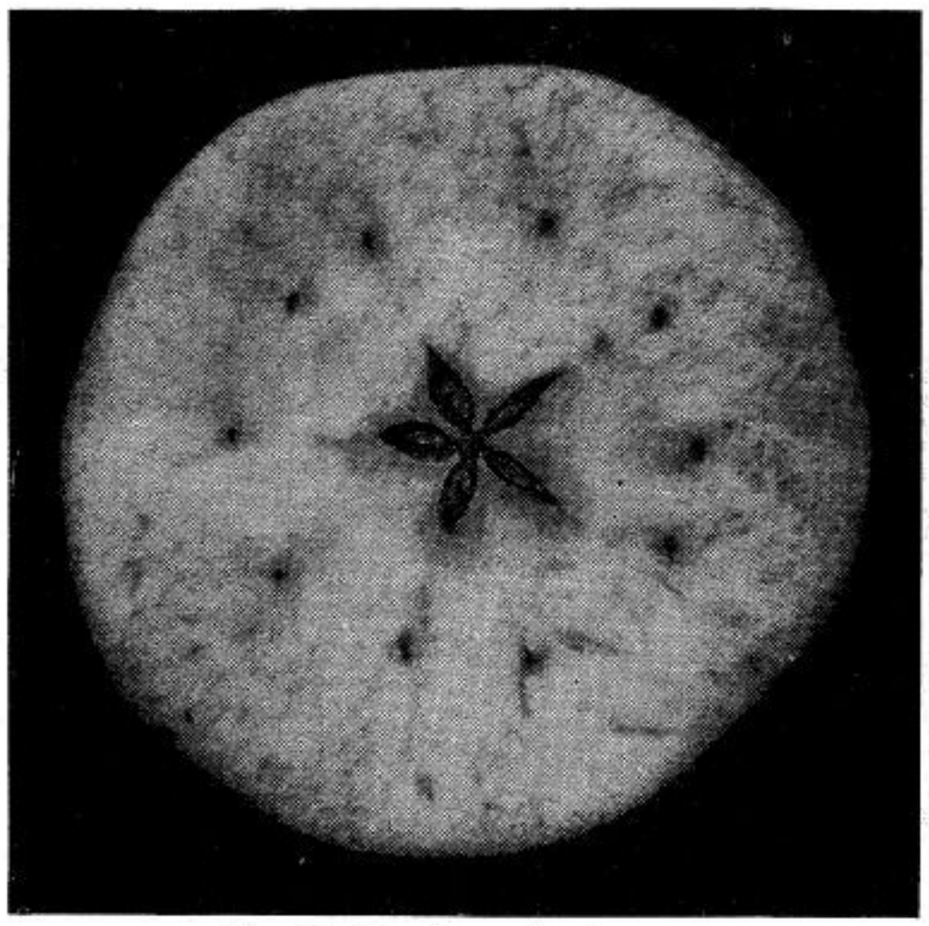
The petals often shelter the essential parts from the rain; they may ward off useless intruders; and they make certain that welcome visitors, such as bees, get well dusted with pollen.

Lowest of all are the sepals, forming the calyx, usually green and substantial, protecting the rest of the flower during the bud stage and steadying the upper tiers against the wind. In many cases the calyx, or part of it, is carried on into the fruit, as is familiar to every one in strawberries from which the green part has not been removed. In some cases the sepals are brightly coloured and help to make the petals attractive, and it may be noted that nectar may be produced by various parts of the flower beside the petals.

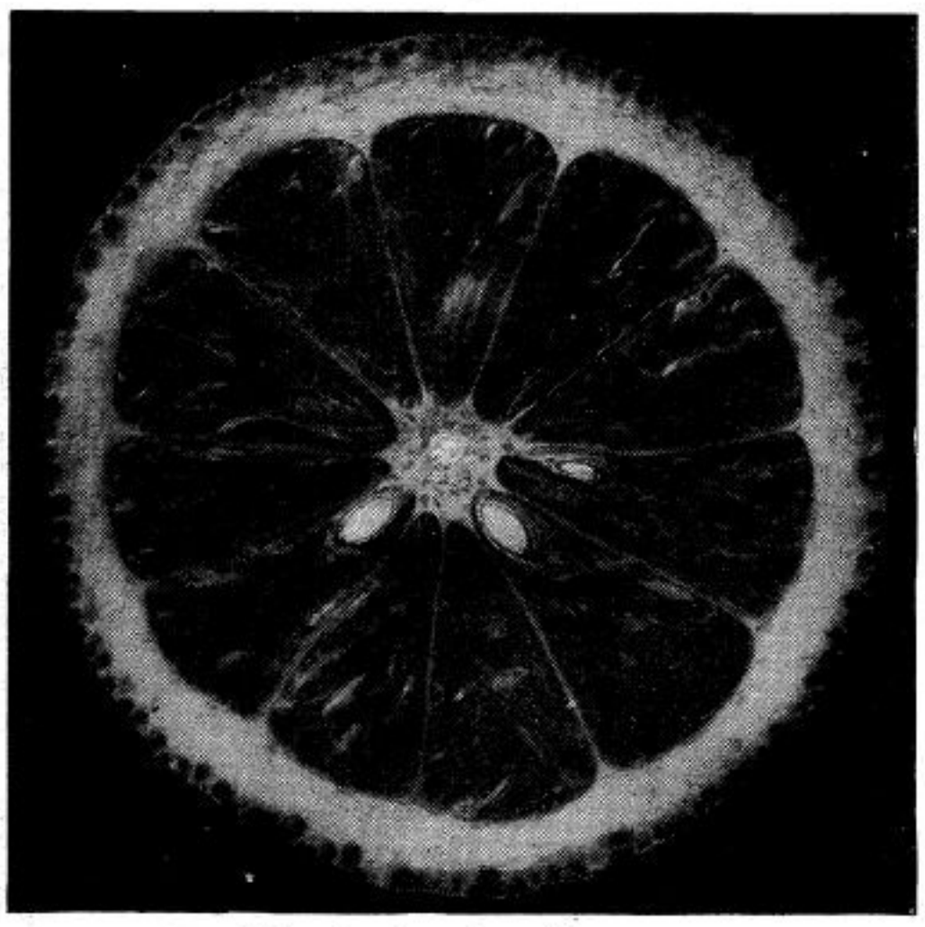
But the big thing is this—the flower consists of four tiers (or whorls) of transformed and often glorified leaves—sepals, petals, stamens, and carpels. As John Ruskin said, "When leaves marry, they put on wedding-robes, and have feasts of honey—and we call them flowers." The flower is the crown of the plant's life, and perhaps

botanists will some day recognise that Darwin's grandfather, Erasmus Darwin, was not wholly fanciful in writing a long poem on *the loves of the plants*.

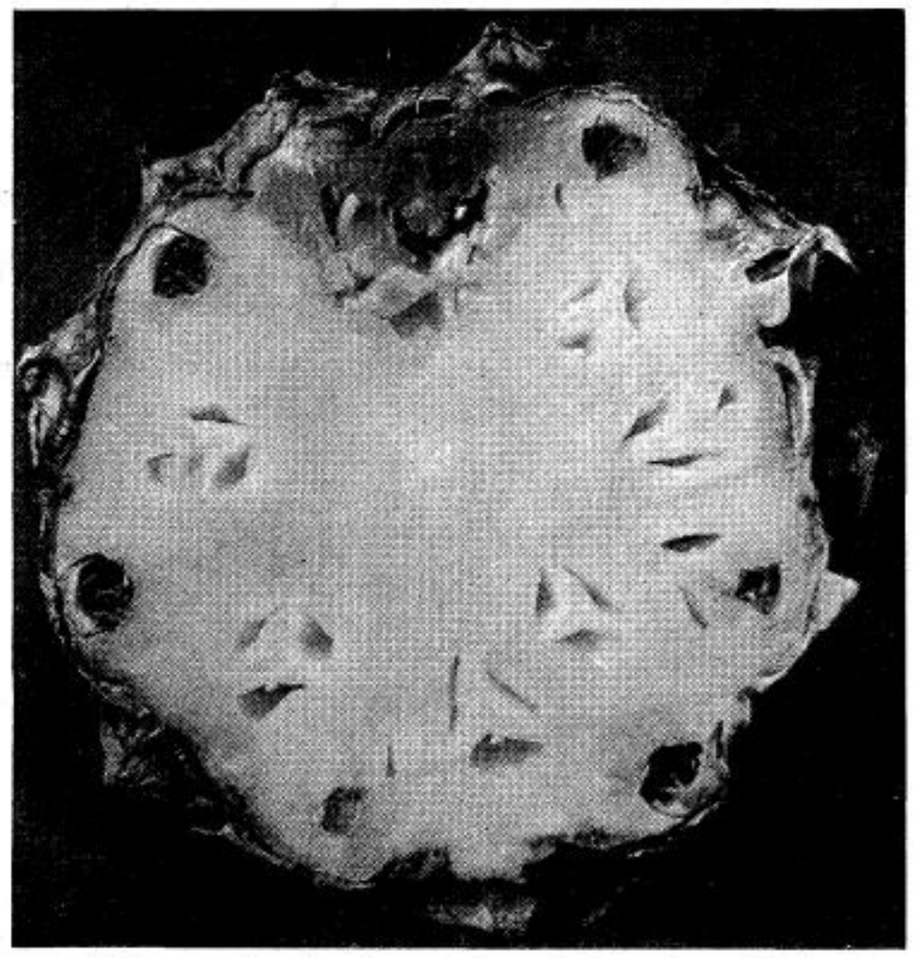
Summer is the time when the Earth gets its largest dividend of solar energy. Much of that warms the land and the sea and the air, and so quickens life. But much of the energy is in the form of light, and, though that is health-giving in many ways, quickening the pulse of life, and in some cases *energising* animals, its chief importance is that it is a source of energy to green plants, which trap it so successfully that they accumulate more stores and munitions than they can possibly need. They thrive and grow, they multiply and spread, and all the more adventurous life of animals rests in the end on the large capital that plants place so liberally at their disposal.



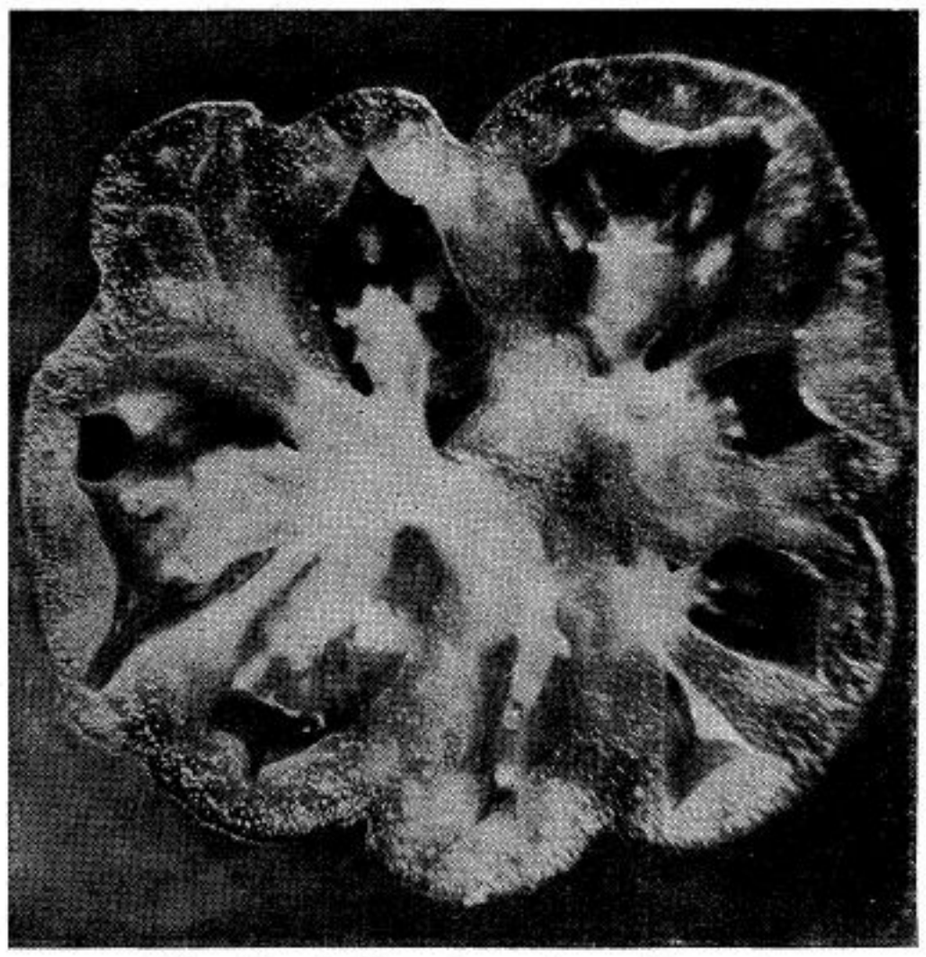
The Seeds of an Apple



The Seeds of a Lemon



Pine-apple Seeds sheltered by the Wall

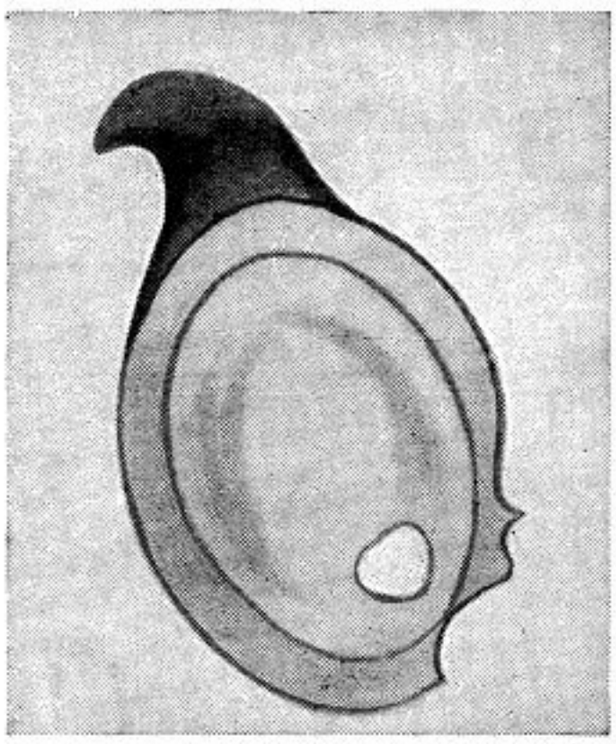


The Seed Chambers in a Tomato

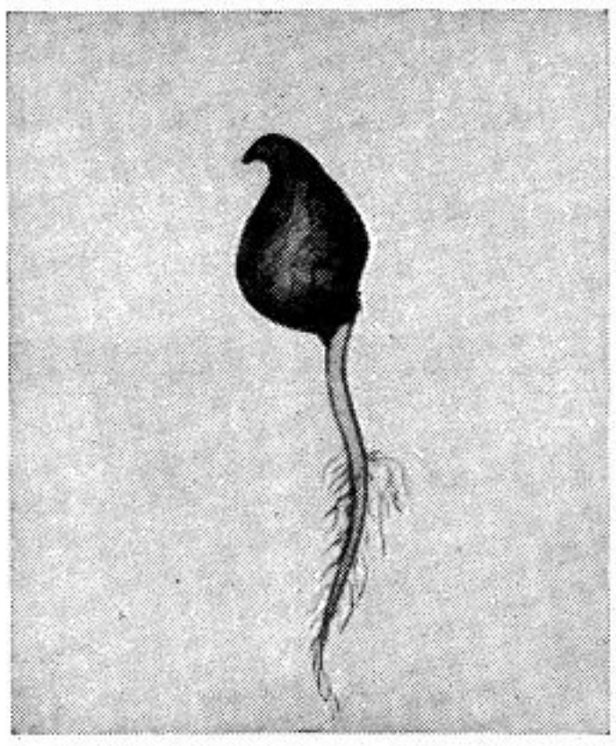
THE BEDS THAT MOTHER NATURE MAKES TO PACK HER FRUIT CHILDREN IN

All higher plants, especially the ordinary flowering plants, are very complicated organisms. There is great intricacy in their make-up, as, for instance, in the architecture of a green leaf. Each cell is like a laboratory, and when there is much work being done, transforming matter and energy from one form to another, there is bound to be wear and tear in the furnishings

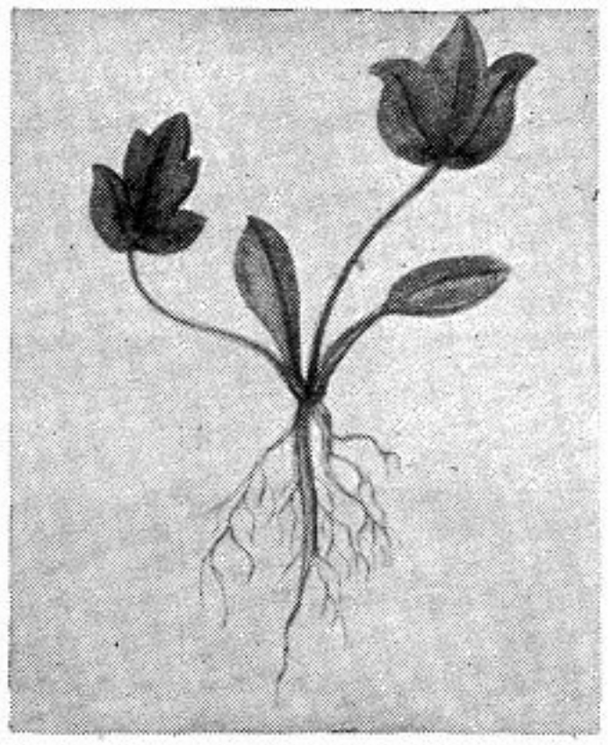
THE LIFE-STORY OF A BUTTERCUP



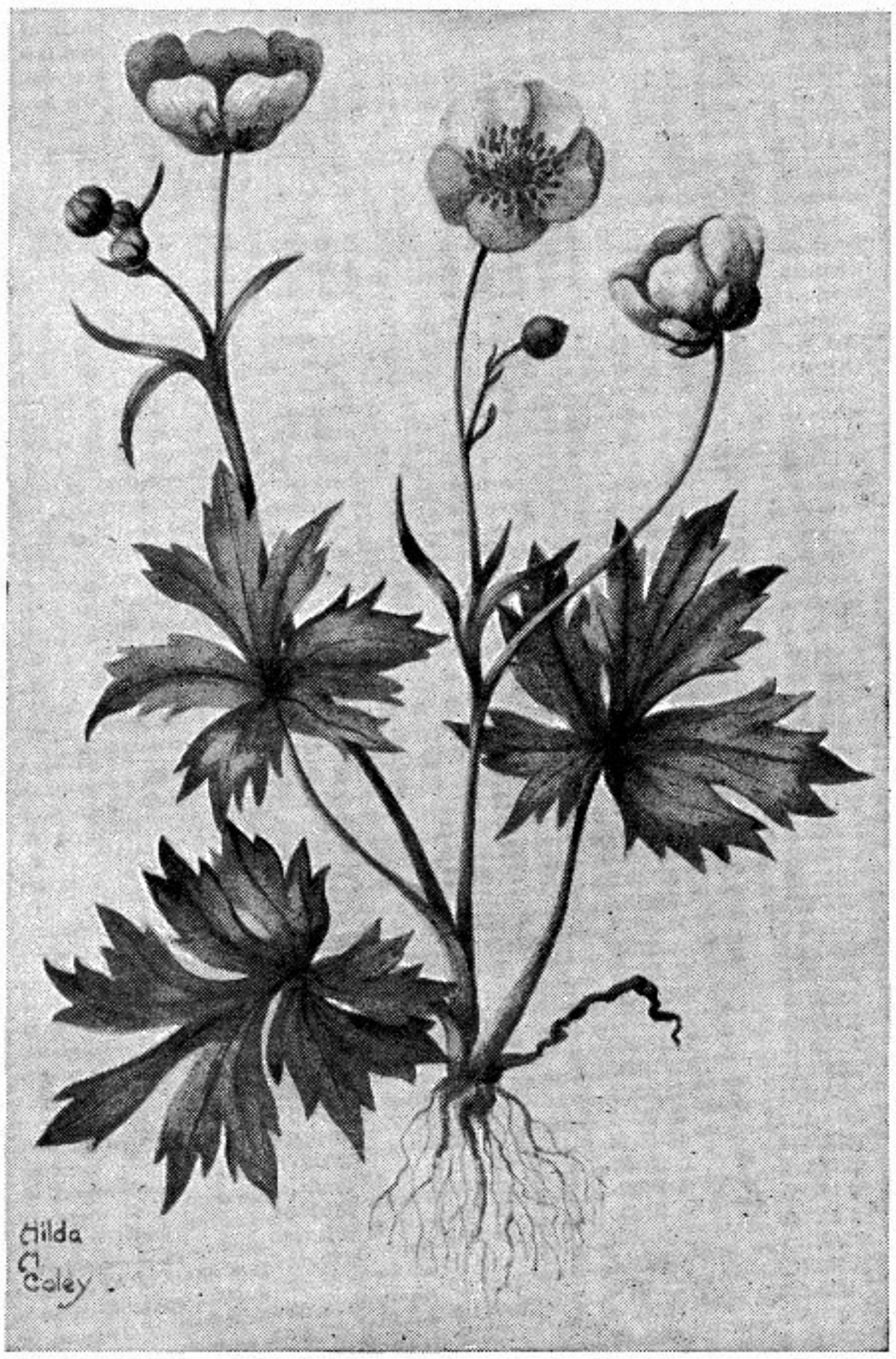
1. The seed of a plant is like the egg of an animal, the product of male and female parents, and here we see the seed of a buttercup inside the female organ of the flower, with the young plant (the embryo) in its earliest stage.



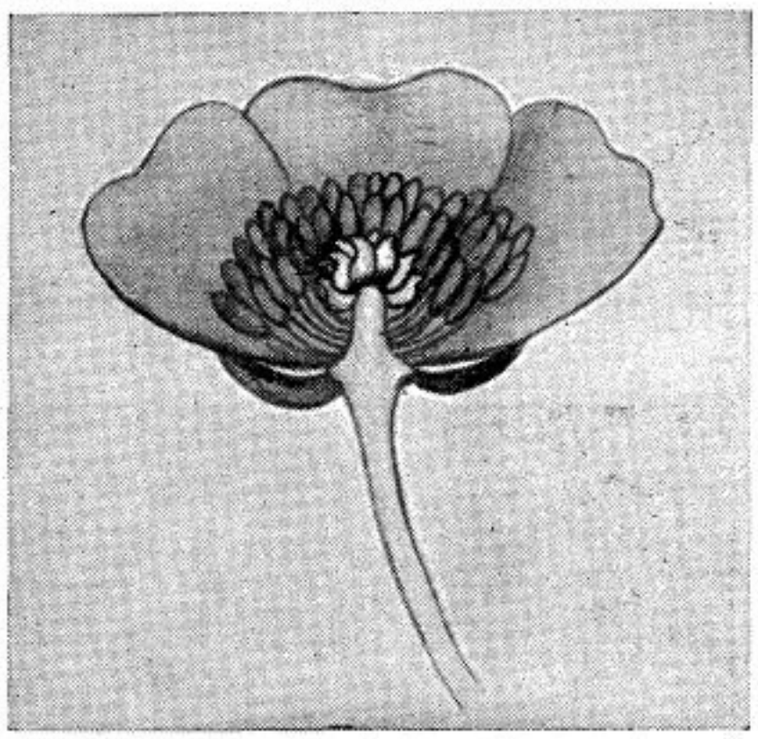
2. The seed (which we call an ovule) absorbs water, and chemical changes take place inside which cause it to sprout, or germinate, throwing out a tiny white thread which is really the root, and always grows downward.



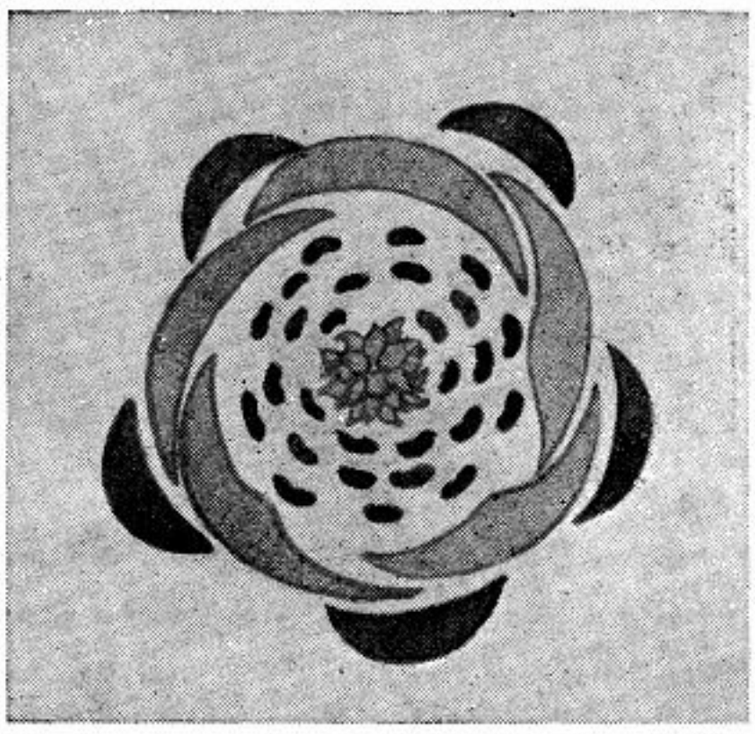
3. The seed-coat now bursts open and a stem begins to grow upward, which we can see is a continuation of the root. Presently tiny leaves that were folded up tightly inside the seed begin to open out and expand.



5. The plant now grows rapidly until at last we have a perfect buttercup with stem, leaves, flowers, and roots, a wonderful work of art containing within itself all the power of carrying on the race. We should appreciate the beautiful flower more if it were rare and costly instead of growing in every field and being within reach of all.



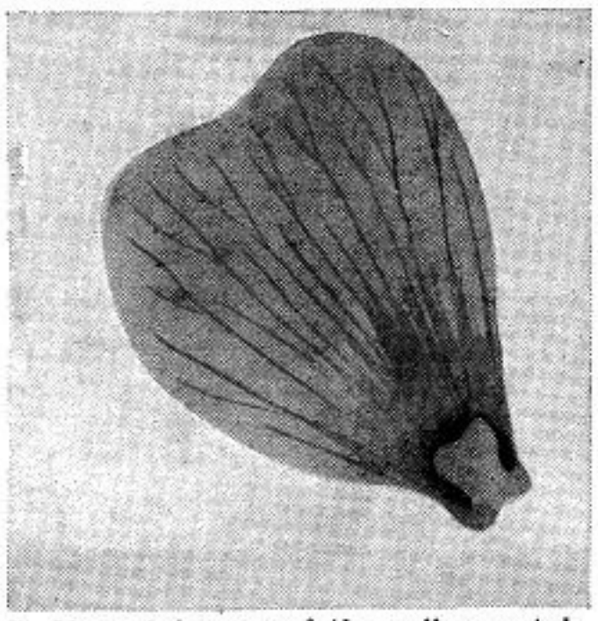
4. The flower is not only beautiful to look upon, but a wonderful and complicated piece of work, as we can see if we cut a buttercup down the centre so as to uncover the inside.



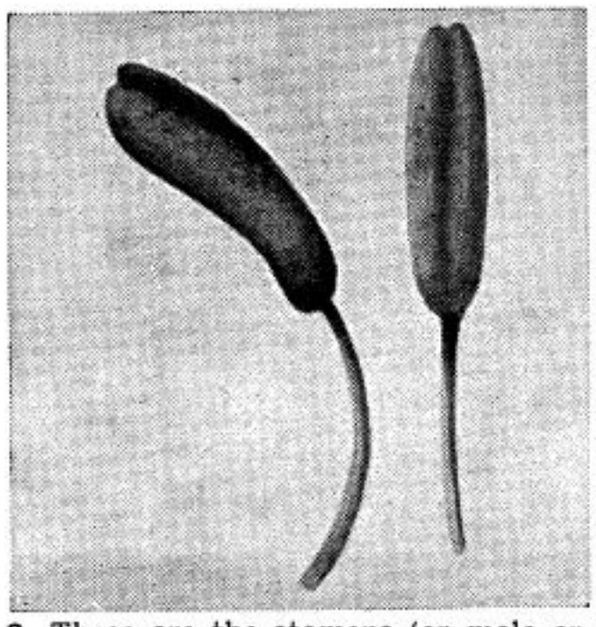
6. Still more wonderful is a horizontal section of the flower, showing the orderly arrangement of the parts. Outside there are the five green leaves (sepals), then the five yellow petals, then the male organs, and then the female organs.

These pictures show the wonderful life-story of a flower, the flower chosen by our artist being the common meadow buttercup. We see it from the seed to the flower and from the flower to the seed again. It is the wonderful story of mother and child, repeated for ever by nearly all living creatures, whether

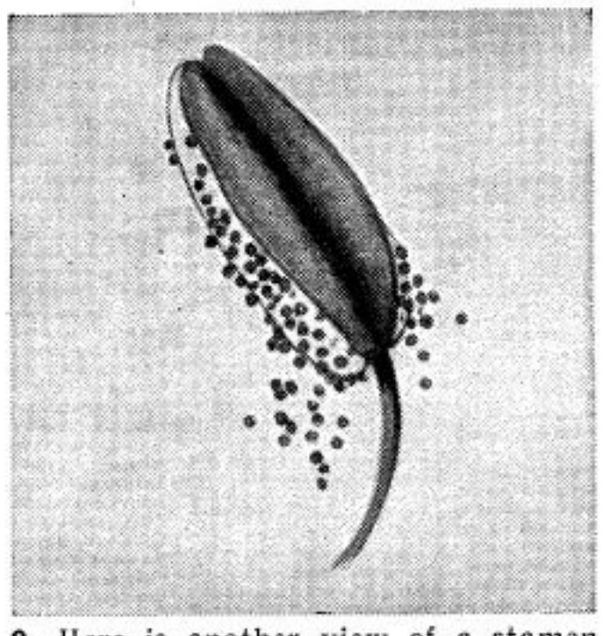
HOW THE RACE OF FLOWERS IS CARRIED ON



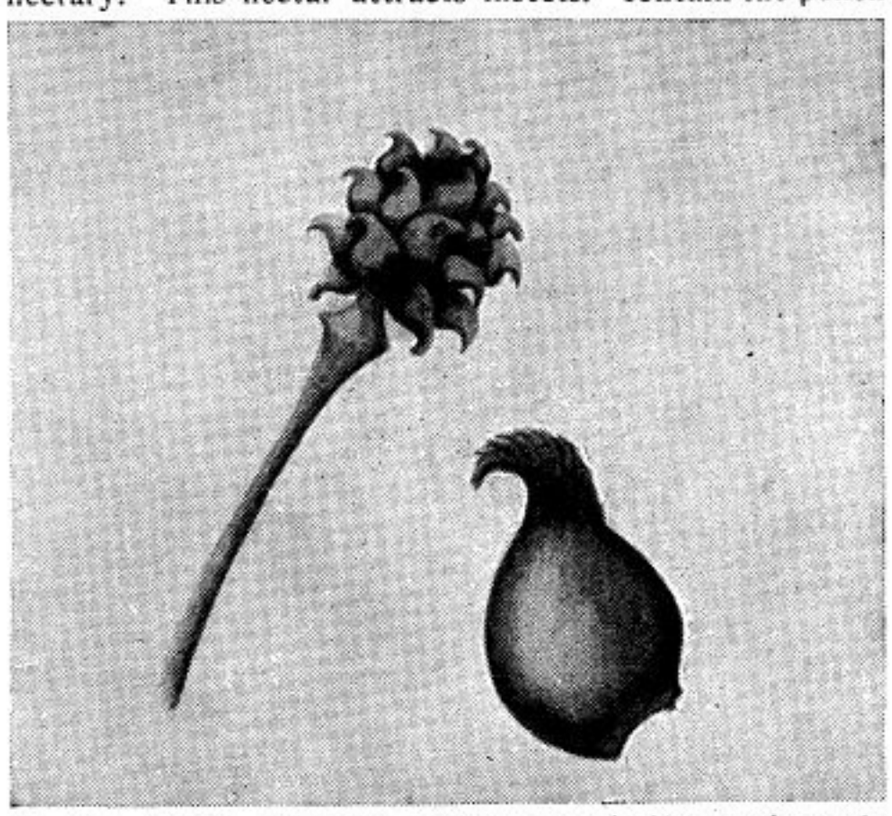
7. If we take one of the yellow petals, we shall find at its base a tiny pocket (or gland) which contains a honey-like fluid called nectar, and is called a nectary. This nectar attracts insects.



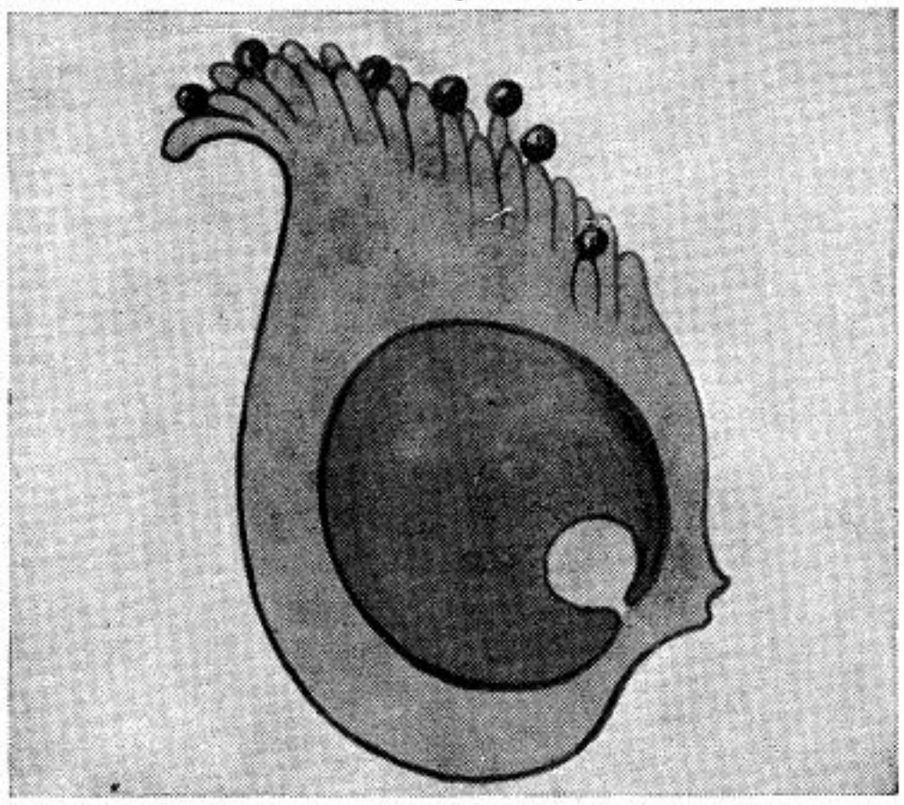
8. These are the stamens (or male organs) of a buttercup a back and front view being shown. The stamen is divided into pockets called anthers which contain the pollen to fertilise the flower.



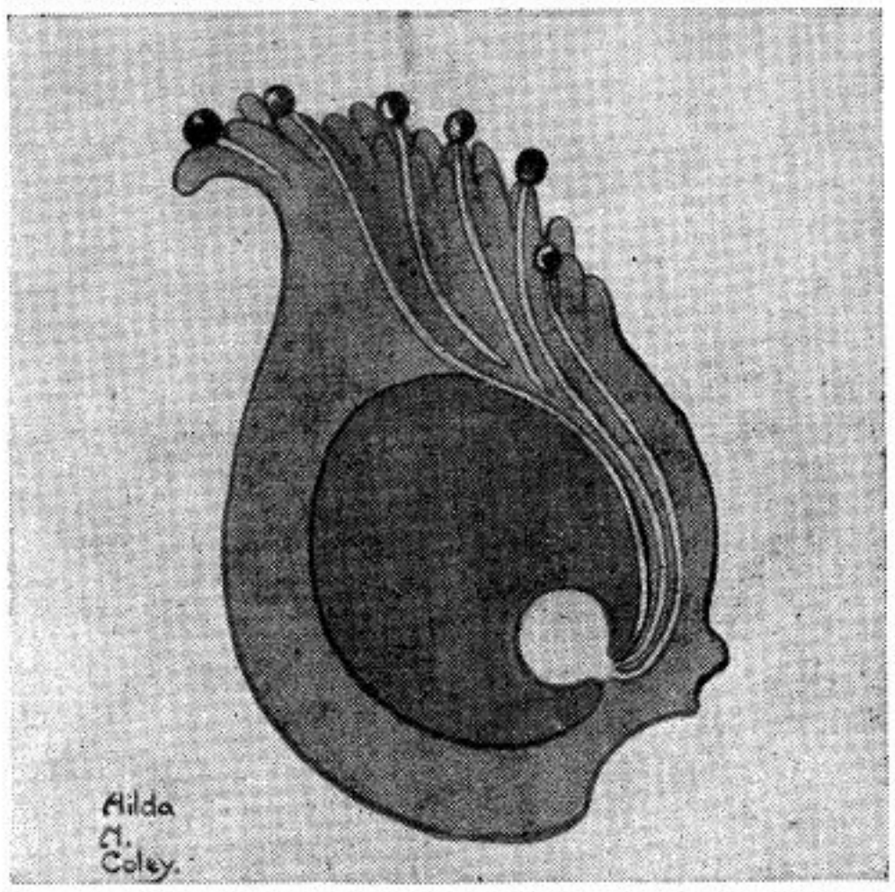
9. Here is another view of a stamen showing the anther open and shedding its pollen, which is in the form of a fine powder consisting of tiny grains, which vary in shape in different plants.



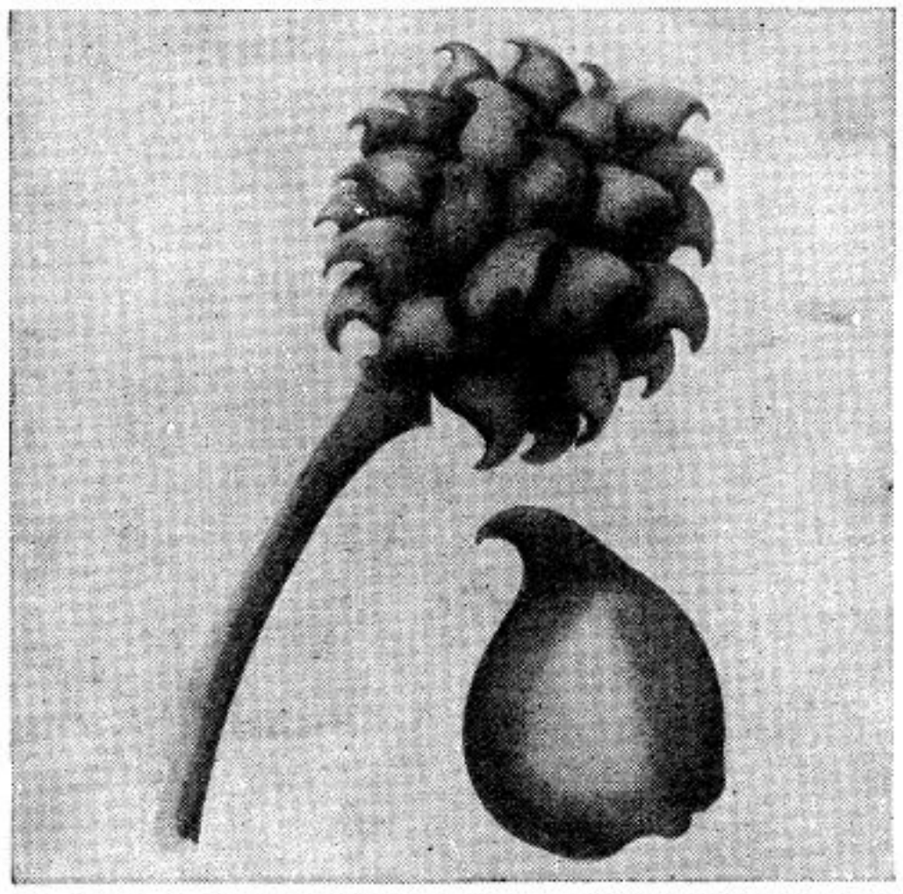
10. The female organ (or pisti') of the buttercup is made up of a number of modified leaves called carpels, clustered round the top of the flower-stalk : and this picture shows such a cluster of carpels, with one detached and magnified.



11. The top of the carpel, called the stigma, receives the grains of pollen that come from the stamen, and here we see the pollen resting on the stigma, while inside the seed-vessel (or ovary) a seed is waiting to be fertilised.



12. A sticky substance on the stigma holds the grains of pollen prisoner, and these at once begin to form little tubes which make their way down into the ovary and penetrate into the seed, so promoting fertilisation. The seed is in this way made capable of producing another plant, and so the race of buttercups is carried on from year to year.



13. Here is a cluster of carpels after being fertilised, one of them detached showing the seed developing. This brings us to the stage of our first picture, and now we have to imagine the whole process going on again. A buttercup will fertilise itself, but the child-plant is stronger if the stigma receives pollen from the stamen of another plant.

they be animal or plant. Everywhere the principle is the same in all cases, but the buttercup has been taken for the purpose of these illustrations because it is the most familiar of all our common flowers. In the buttercup as in many other flowers both parents appear on the one plant.

of the laboratory—that is to say, in the microscopic framework of the living cells. In other words, *ageing is inevitable.* As Shakespeare said :

> And so, from hour to hour, we ripe and ripe,
> And then, from hour to hour, we rot and rot,
> And thereby hangs a tale.

To a long-lived plant, every spring and summer bring opportunities of becoming more or less young again, and this is taken advantage of. Ageing is staved off, but in the end it wins. In many other cases there is a sacrifice of hard-worked parts, and the plant automatically sheds what has become a source of weakness, as we see in the falling of the dead and exhausted leaves of trees. But there are limits to this saving of the life by losing it. In the end age must win, and what we see so characteristically in autumn is the waning of life, either for the year or for ever, as far as the individual plant is concerned.

The fall of the leaves is characteristically autumnal. They have worked hard ; the furnishings of the laboratory show wear and tear ; the leaves are ageing. Moreover, with lowered temperature and frozen ground they could not continue the use they make of water. The supply cannot be kept up, and even if water were available, it would be liable to freeze in the leaf and burst the cells. Thus the leaves *have to fall,* and it is well for the plant that this should be so.

THE WITHERING AND FALLING OF THE LEAVES IN AUTUMN

A very interesting point to remember is that before the leaves are shed there is a migration of most of the useful material into the stem of the plant. The remnants of the green colouring matter (chlorophyll) account for the yellowness of the leaf when it is ready to fall.

And along with the withering and the fall of the leaves we must take the dying down of the stems of many herbaceous plants, so that nothing is left exposed to the cold of winter. If a sudden frost comes the parts above ground may be killed in a night, while there is still much life in them, and that means great loss to the plant. When cold sets in gradually there is a retreat of almost all that is valuable into the root. Thus what withers and is swept away as rubbish is often as empty as a fallen leaf.

But there is another very distinctive note in the life of the plants in autumn. Just as we associate sprouting and leafing with spring, and flowering and intense growth with summer, so we must recognise autumn as the season of fruiting and seed scattering. The fruit is what remains of the flower after the ovules have become genuine seeds. Stamens and petals fall away ; the sepals often wither ; the supplies which may still be coming up the floral axis are drafted into the fruit, which often becomes very substantial, or into the seeds, which receive a useful legacy of proteins and fats.

HOW THE PLANT SAVES ITS LIFE IN HARD TIMES

As the flower withers the nectaries close, and the sugary material which overflowed in these glands may be drafted into the fruit. Besides juicy fruits there are multitudes of dry pods and capsules, which liberate the seeds by breaking up ; though transformed in connection with the production of young trees, they are really leaves, and it is natural that they should wither.

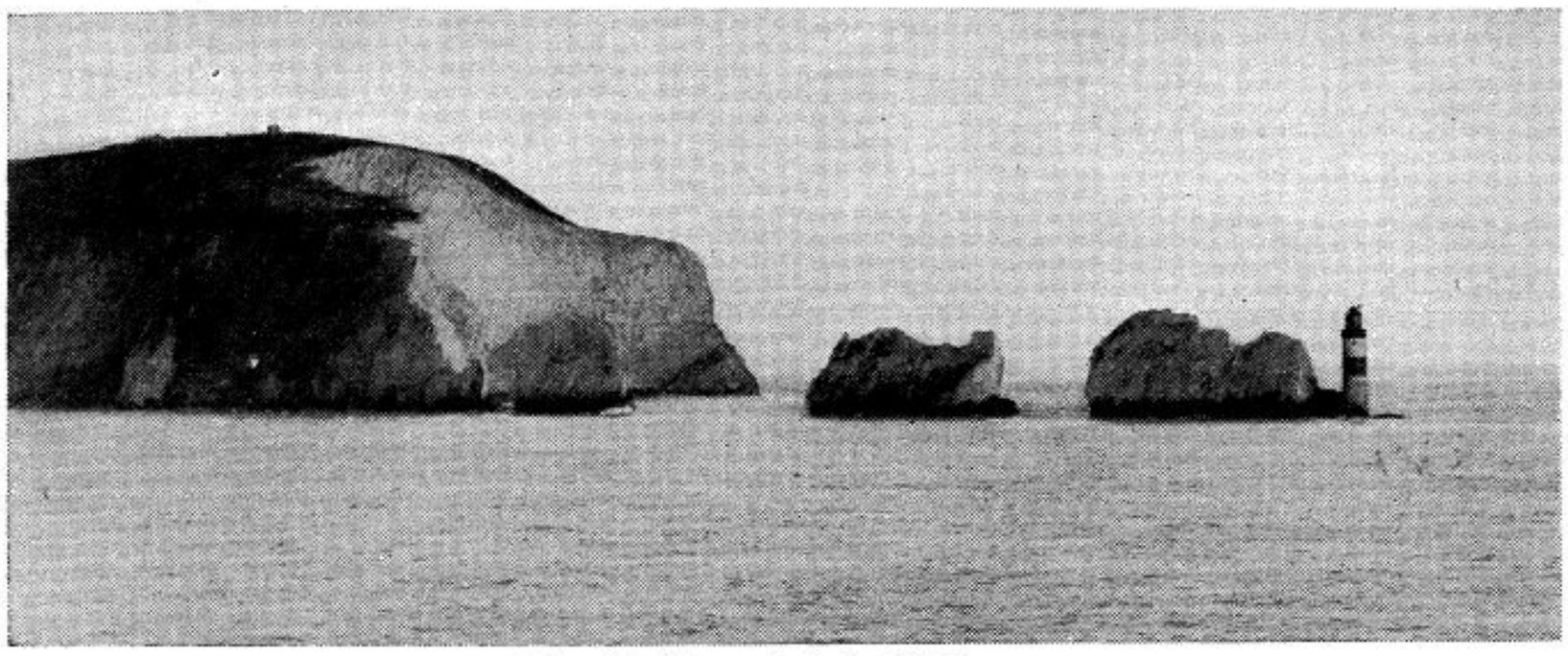
In the warm countries of the northern hemisphere, most plants pass into a state of rest. The leaves have fallen ; the buds are well wrapped up ; it may be that there are no parts left above ground ; there are stores in underground parts ; the seeds are sleeping in the crannies. This is partly the natural reaction after a period of great activity, and partly an adjustment to hard external conditions. The plant needs a rest, as the fall of the leaf shows ; it saves its life in hard times by lying low.

Evergreens, like the holly and the pine, have leaves specially suited, by their tough skins, to stand the cold and to go on slowly capturing winter sunshine ; but we have only to walk under these trees to see that their leaves also have a very limited lease of life. They fall off piecemeal, as it were, not all at once as in ordinary trees.

THE PAUSE IN THE PLANT'S LIFE BEFORE A FRESH START

Then there are woolly plants, like edelweiss, which are so well wrapped up that they do not need to die down as so many herbaceous plants must. Besides evergreens and woolly plants, there are many exceptional cases, but these do not affect the truth of the general idea that winter is a time when the fires of life burn low, if they do not go out altogether. It is a time of retreat, retrenchment, and rest. It may be a full-stop in the life-history, but it is often a semicolon, a pause, a preparation for a fresh start, a crouch before a spring.

The Story of the Peoples of All Nations and their Homelands



The Needles and their lighthouse

SEEING OUR HOMELAND FROM THE SEA

LOVELY it is to look at our Homeland from the sea. Let us imagine ourselves sailing Westward Ho! from busy Southampton. Passing Calshot Castle on our right to enter the Solent, with the Isle of Wight on our left, we turn south and west, passing Beaulieu River creek, gateway to the New Forest. The shore is fairly high with a vista of hills and woods behind.

Reaching Christchurch with its Priory we look down the coast to Bournemouth, Poole Harbour, and Swanage, a pleasing prospect of low, sandy cliffs crowned with pines and rich in gorse. From the tideway of Poole Harbour, through a gap, we may see Corfe Castle against the background of the Purbeck Hills. Beyond Swanage Bay, from Durlston Point to St Albans Head, the coast is bold and steep, receding in a wide bay scarred with quarries. Here runs a jumble of dark water, the Race. To the south-west is Portland, to the north the wooded pinnacle of the Nothe rises above Weymouth Bay. The pale cliffs of the Dorset coast are like a chain of gables, with slopes of downland behind, and here and there a mustard field among the green, and here and there toy villages. Coppices come down to the water's edge.

Passing Lulworth Cove and Durdle Door we reach Weymouth Bay, Portland Isle, and Portland Bill and its lighthouse with another Race at its foot. This Race has helped to pile up the famous Chesil Beach, one of the great natural breakwaters of the world. Beyond is Bridport, then Lyme Regis, from which four ships sailed to aid Edward the Third and two to join in the attack on the Spanish Armada. The coast is hilly; behind it rises Golden Cap, and farther west is the chalk cliff of Beer Head.

From here to Sidmouth, sheltered by its high Peak Hill, there is a succession of red cliffs with narrow valleys in between. Salcombe Regis Chine is one, and after Budleigh Salterton, behind the shingle bank, is pretty Ladram Cove with its pinnacle rocks and Otterton Point. As Straight Point is weathered the beautiful valley of the Exe lies before one. From Exmouth to Teignmouth the coast is fairly steep, with the red rocks of Dawlish halfway between. Thence we pass Oddicombe Beach to Hopes Nose, round which, in Torbay, lies on one side Torquay, and on the other Brixham with its trawlers. To Torbay Napoleon was brought in the Bellerophon and to Brixham came William of Orange on a Protestant wind.

From Brixham and Berry Head the coast is dangerous as, after sighting the Start Lighthouse, we pass Mewstone Peak to Dartmouth Harbour and the

mouth of the entrancing River Dart, with lofty Kingswear facing the romantic old town to which the river gives its name There is no lack of rocks hereabouts and the headlands are in keeping, but after passing Prawle Point, the sandy bar of Salcombe, magnificent Bolt Head, and the entrance to Bigbury Bay and Wembury Bay, all is plain sailing to the mouth of the Yealm and Plymouth Sound.

PLYMOUTH AND THE HARBOURS ON THE WAY TO THE LIZARD

Plymouth, with green Mount Batten, lies half-revealed and half-concealed. Its old red town and famous Hoe must be singled out before they can be seen From Plymouth Sound to Fowey is a short sail. The Eddystone Lighthouse rises 152 feet above high water, a grey circular tower with red gallery and lantern. The stump of the old Smeaton Tower stands a little to the north. The coast is rugged to Port Wrinkle, and between here and Looe are the Sherbeterry Rocks More steep coast and then come Polruan, Fowey Harbour, and St Austell Bay.

There are busy little harbours all the way to Dodman Point, a cliff as high as St Paul's and, like St Paul's, with a cross at the top. Then come Porthloe, with many rocky outliers, and Zone Point (more familiarly known as Zoze Point), opposite Pendennis Castle, and we are at Falmouth, where come the last of the old windjammers, the picturesque sailing barques bringing wheat from Australia. A little south are the dreaded Manacles and rocky coast, with Coverack Cove, Cadgwith Cove, and Housel Bay breaking it, on the sail to the Lizard.

PICTURESQUE ST MICHAEL'S MOUNT AND GREY-FRONTED PENZANCE

The twin lights of the Lizard, with the Stag Rocks at its base, shine across Mounts Bay. Round the Point are Kynance Cove with its two pretty islets, lofty Rill Head, Mullion Island and its Cove, Loo Pool, and Porthleven. Then we reach Marazion and the causeway that at low water joins it to St Michael's Mount, whose central tower rises 250 feet above the sea, and grey-fronted Penzance, whose stony streets climb up the hill past Newlyn on the west. From Mousehole Harbour to Land's End the coast is an epitome of Cornwall. Breaking its rocky contours are Lamorna Cove, with the guardian Carn Dhu and the stream running past the mill to the sea; and Creed Castle, with the Logan Stone, and Porthcurnow and Porthgwarra, where the Atlantic cable comes in.

Land's End is not the end. Some miles away are the Scilly Isles, islands of flowers on which anything will grow; while beyond them is the Bishop Rock and its lighthouse. At the entrance to Whitesand Bay is the Longships Lighthouse, and Cape Cornwall rises about 200 feet as against the 60 feet of Land's End. Off the Cape are the rocky Burons. Just beyond the Cape is Botallack Mine, some of whose galleries run below the sea. Beyond rises the tower of St Just. Turning in east we come to Pendeen Point and the dark mass of Gurnards Head, with Mulfra Quoit and its cromlech crown behind, and pretty Zennor below.

WHERE LOFTY TINTAGEL BREATHES THE VERY SPIRIT OF ROMANCE

Beyond Carn Naun and Battery Point is St Ives, looking toward Gwithian and Godreva Head across the bay. Passing St Agnes Head, Perran and Holywell Bays, and Kelsey Head we reach Newquay, Watergate Bay, and then Trevose Head, with Padstow Bay between it and Pentire Head. Padstow with its Doom Bar and inlet are not impressive, but lofty Tintagel breathes the very spirit of romance. Opposite is High Cliff, the termination of Resporvel Down, rising 850 feet. Tintagel is lower, but noble and steep, its castle beautifully placed and the church tower behind. Two miles farther is the inlet of Boscastle, with a legend of bells sounding beneath the waves.

The cliffs rise 700 feet and more till we come to Cambeak Head and Widemouth Bay, Bude, Chapel Rock, and Efford Beacon Round dark Hartland Point, with its lighthouse, and then Clovelly Cove and Bideford Bay and the Bristol Channel are before us, with Lundy Island about midway between Hartland Point and St Anne's Head in Pembrokeshire.

East of Clovelly the rocky coast gives way to sandhills as it sweeps round to the mouths of the Torridge and the Taw, with Bideford at the head of one and Barnstaple at the head of the other Just by Appledore is Northam Burrows, and behind it are the links of Westward Ho! The coast runs north to Baggy Point,

then round and to the east of Morte Point we come to Ilfracombe. Beyond Combe Martin Bay the Great and Little Hangman hills rise nearly 1000 feet, the romantic cleft of Heddons Mouth points the way to Exmoor, the steep shores become wooded, and Borthaven, Lynmouth, and Lynton attract by their beauty, a delightful panorama continuing all the way to Porlock.

AN ISLAND WHENCE WIRELESS MESSAGES WERE SENT BEFORE MARCONI'S DAY

Behind Porlock is Dunkery Beacon; then come Minehead and Blue Anchor, and Burnham, and half-way across the narrowing Channel are the islands of Flatholm and Steepholm. It was from Flatholm that some of the early wireless messages were sent to the mainland before Marconi came on the scene. Weston-super-Mare is reached beyond Brean Down, and beyond the mouth of the Yeo is Clevedon, whence a tall hill edges the coast to Portishead. Then it sinks again and Dumball Islet marks with its beacons the mouth of the River Avon, with Clifton and Bristol six miles inland. Some way beyond New Passage the Ship Canal reaches the Severn at Sharpness Dock. Now we cross to the north side of the Severn and sight Chepstow standing impressively above the River Wye.

THE VARIED SCENE BETWEEN CARDIFF ROADS AND THE CHESTER FLATS

Between Cardiff Roads and the Chester Flats Wales has more than 500 miles of coast, with towering cliffs, majestic headlands, submerged and jagged surface reefs, sandbanks and sand dunes, old castles and churches, estuaries, and mountainous backgrounds, with many signs of the ebb and flow of erosion and reclamation. Soon after leaving the Rhymney estuary we reach that of the Taff and the great docks of Cardiff and Penarth, with Barry just round Lavernock Point. Between Barry and Porthcawl promontory are the Tressilian Caves and St Donat's with its ancient church and restored castle (the poor man at the rich man's gate). Then two lighthouses give warning of the grim Tusker Reef.

Next come the wide sandy sweep of hill-encircled Swansea Bay, with Port Talbot's limestone ridge on our right and, across the bay, Oystermouth and the Mumbles islets off the south-eastern point of the rugged grandeur of the Gower Peninsula, with Langland, Caswell, Oxwich, and Port Eynon Bays. At the south-west corner of the peninsula is Worms Head with its dragon crag, and round it delightful Rhossili Bay. Then we reach the salt marshes of the shallow Burry Inlet, the eastern arm of Carmarthen Bay, the mouths of Taf and Towy, and, on the farther shore, pleasant Tenby, Caldy Island with its Priory, and St Margaret with its light.

Between Oldcastle and Stackpole headlands can be sighted ruined Manorbier Castle, and beyond St Gowans Head and Linney Head the coast bends northward to the splendid harbour of Milford Haven, with Pembroke Dock well inland. Rounding the promontories of St Ann and Great Castle and passing the islands of Skokholm, Grassholm, and Skomer, we come to the wide opening of St Bride's Bay, north-west of which, off Ramsey Sound, are Ramsey Island and the Bishop and Clerks islets with their light.

CADER IDRIS COMES INTO VIEW WITH DOLGELLY IN ITS SHADOW

Beyond the bold St David's Head, with its lighthouse, the much indented coast runs north-east to Strumble Head, also with a lighthouse, and round Pen Caer we reach Fishguard Bay, the G.W.R. port for Rosslare and Cork, with lofty Dinas Head dividing it from Newport Bay. Another notable headland is that of Cemmaes, which protects Port Cardigan. Beyond are New Quay on its rocky hill, Aberayron, Aberystwyth, and the mouth of the Dovey. Soon Cader Idris comes into view, with Dolgelly in its shadow, and the fine estuary of the Mawddach, with Old Barmouth overlooking the new town below it.

Soon after passing Mochras Island and its submerged reef (St Patrick's Causeway) historic Harlech and its castle are seen, and we come to the treacherous sands and legendary inlets of Traeth Bach and Traeth Mawr. Criccieth and its castle crag overlook Tremadoc Bay, which washes the eastern shore of the lonely and rockbound Lleyn Peninsula. Facing Harlech, on the farther side of Tremadoc Bay, is Pwllheli. To the south of Pwllheli are the St Tudwall Islands with a lighthouse, Gimlet Rock, and a deep indentation between Wylfa Head and Penkilan Head.

round which is the long sandy reach of Porth Nigel, more familiar to sailormen as Hell's Mouth. Westward we come to the rushing waters of Bardsey Sound and Bardsey Island and lighthouse and the Yellow Rock of Lleyn.

Rounding Braich-y-pwll we enter the broad waters of Caernarvon Bay and, some distance up the coast, which shelves to the east, Porth Dinlleyn, the finest natural harbour of North Wales, and the prehistoric hill-fort of Dinas Dinlle. Beyond it The Rivals rise above 1800 feet, with Gwydir and its lighthouse farther on.

THE HAZARDOUS MENAI STRAIT AND CAERNARVON'S NOBLE RUIN

There is little more of interest till we come to the entrance to the hazardous waters of the Menai Strait running between Anglesey and the mainland to Bangor and Penrhyn on the east and Beaumaris on the west, with Caernarvon and the superb ruins of its castle at the mouth of the Seiont. Anglesey, the ancient Mona, and at one time a stronghold of the Druids, has few picturesque features beyond Beaumaris Castle, Redwharf Bay, Puffin Island, and Penmon Priory on the north coast. On the west is Holy Island with, on Holyhead Bay, the L.M.S. port for Dun Laoghaire and Dublin. Holyhead Mountain rises 719 feet. Off Holy Island is the South Stack Lighthouse and off Carmel Head to the north-west are the Skerries and their light.

Returning to the mainland, across Beaumaris Bay, we come to Conway and its walled castle, above Conway River. To the north the huge promontory of the Great Ormes Head (680 feet) shields popular Llandudno, with lovely Ormes Bay between it and the imposing Little Ormes Head (463 feet) and its interesting caves. Eastward are Rhos-on-Sea, Colwyn Bay, Rhyl, and Prestatyn, and round Point of Air, whose light is a lofty companion to that of the Great Ormes Head, we come to the sandy shores of the Dee washing the northern shores of Flintshire for some distance beyond Flint and the ruins of its old castle.

The long neck of land which divides the Dee from the Mersey extends north-west to Hilbre Point, north of Point of Air, and New Brighton, nearly opposite Bootle on the Lancashire side of the Mersey. Birkenhead and Liverpool face one another a little way up the river. Between Hilbre Point and Formby Point, for about eight miles out to sea are sandbanks, including the Blundells; and north of these are one lighthouse and three light-ships to warn the mariner of the perils in his way.

WHERE LANCASTER OVERLOOKS THE FINE ESTUARY OF THE RIVER LUNE

The coast is dull and uninteresting past pretty Southport, as far as the Ribble estuary, sands and sandhills alternating to the south shore of Blackpool, though between St Anne's and Blackpool the sands draw in more to the shore. From the sea Blackpool looks an imposing place. Red clay cliffs rise behind it, and between it and Rossall Point; but beyond the ports of Fleetwood and Heysham the sands resume their sway. Morecambe is one of the gates of the Lake District, with Lancaster near by, overlooking the fine estuary of the Lune.

Off the western extremity of Morecambe Bay is the long and straggling Walney Island, north of which are the Duddon Sands. Beyond these Black Combe is seen rising 2000 feet above the shore. North of the Selkar Rocks and their beacon is the Ravenglass Inlet, and beyond this St Bees Head, a perpendicular cliff of red sandstone and the nearest point of England to the Isle of Man, 27 miles away. Next is Whitehaven, and then comes Harrington, where cliffs rise behind the low foreshore, and there are rocks and ledges out to sea.

BOLD MAUGHOLD HEAD AND THE WOODED STEEPS OF THE ISLE OF MAN

There is little change to Workington and the mouth of the Derwent, a low coast leading to Maryport, whence to Allonby Bay sandbanks extend and encroach till the Solway Firth narrows above Wampool Mouth and, beyond Bowness and Port Carlisle, we come to Rockcliff Marsh between the Eden and the Esk and so reach the Scottish border, where the little Sark enters the Esk estuary just below Gretna Green.

Before dealing with Scotland's coastline we may look for a moment at the Isle of Man. From Ayre Point, its northern extremity, behind which North Barrule and Snaefell are seen, the east coast to Ramsey is edged with sand and shingle leading to low, gravelly cliffs, which rise

to bold Maughold Head. Behind this are wooded steeps climbing up to North Barrule. Here is clearly seen the island's mountainous backbone rising south-west above its central valley to South Barrule. Southward of Maughold Head steep hills are close to the edge of low cliffs with copses in the valleys.

THE HEADLAND WHICH RECALLS THE FATE OF THE SPANISH ARMADA

At Laxey Bay Snaefell dominates beautiful scenery and the coast is bold and rugged and indented to steep Douglas Head and St Ann's Head. Round Langness Point and its lighthouse is the complete horseshoe of Castletown Bay. The most southerly point is precipitous Spanish Head. Here is the little Calf of Man. Beyond, to the north, is the promontory of Bradda Head above Port Erin, with, beyond, Peel and its castle and a coast that never loses its charm.

Returning now to the shallow and sandlocked Solway, in which the tide rises 20 to 26 feet and is extraordinarily variable in the speed and direction of its ebb and flow, we come to the beginning of Scotland's no less extraordinarily variable coastline, its innumerable sea lochs, straits, and islands, stacks and lofty heights of gneiss, sandstone, limestone, granite, and so on. Above Blackshaw Flats, between the Esk and the Nith, is Caerlaverock's fine ruin.

The shore then becomes rocky to Kirkcudbright and Wigtown Bays and round Burrow Head, the southernmost point of the Machers Peninsula, the scene of St Ninian's brief mission. At the entrance to Luce Bay are the Scare Rocks and the gaunt headland (or Mull) of the double peninsula (or Rhinns) of Galloway, on the north-west of which are Locknaw Castle and Corsewall Point, rounding which we come to Loch Ryan, with Stranraer, the L.M.S. port for Larne and Belfast.

THE IMPOSING CLIFFS OF THE BLEAK CARRICK COAST TO GIRVAN

Imposing cliffs mark the Carrick coast from Ballantrae to Girvan, seaward from which Ailsa Craig with its lighthouse rises 1114 feet above the water. Then come Turnberry, the reputed birthplace of Robert Bruce ; Dunure Point and castle ; Ayr and its memories of Burns ; Troon, with harbour, docks, and fine sands ; Irvine Bay, Saltcoats, and Ardrossan ; Fairlie, with another castle ruin ; Largs, Skelmorlie and its castle, and Gourock. East of Bute, famous for its kyles (straits) as the Firth of Clyde narrows, are the islands of Great Cumbrae and Little Cumbrae. South of Bute Sound is mountainous Arran and west of Kilbrennan Sound the long peninsula of Kintyre. Lying off the Mull of Kintyre is Sanda Island and off its west coast Gigha Island, to the east of which West Loch Tarbert almost divides Kintyre Peninsula from the equally mountainous Knapdale. Across Jura Sound on the west are the islands of Islay and Jura, southernmost of the Inner Hebrides.

Off Jura lie Oronsay and Colonsay, and, west of the Firth of Lorne, cut off from Morven by the Sound of Mull, is the massive island of Mull with rugged coasts and smaller islands off its western shores, among them Iona with its relics of St Columba and Staffa with Fingal's Cave. Between Mull and the Argyll coast is little Kerrera Island sheltering the popular resort of Oban, to the north of which is Lismore Island, in Loch Linnhe, with Fort William at its head and, north-eastward, Telford's Caledonian Canal with its famous Neptune's staircase.

STARTING-POINT FOR THE MISTY ISLE OF SKYE

Passing through the Sound of Mull we have Loch Sunart and Ardnamurchan on our right and, on our left, the islands of Coll and Tiree, with remains of Danish forts on the first-named. Rounding Ardnamurchan Point, off Arisaig Sound, we see the islands of Muck, Eigg, Rum, and Canna. North of Arisaig is Mallaig, a starting-point for the misty Isle of Skye. Beyond the Minches, to the west, lie the Outer Hebrides, including the Barras, the Uists, Harris, famous for its tweeds, and Lewis.

Through the Inner Sound to the north of Skye we pass Applecross, Loch Torridon, Gair Loch, Melvaig, Loch Ewe, Greenstone Point, and the islands beyond Gruinard Bay and Loch Broom. Then come the cape of Rhu Coigach, west of Enard Bay, the Point of Stoer, at the southern point of Eddrachillis Bay, Scourie, and Kinloch Bervie. Finally we reach Cape Wrath and its light rising 523 feet, having realised on our journey how true it is that Scotland is best seen from the sea. Along the deeply indented north coast of Sutherland

and Caithness we pass to Thurso with its episcopal palace ruins and its bay; Dunnet Head, Scarfskerry, and Gills, off which is Stroma Island, John o' Groat's and Duncansby's bristling stacks.

Between Dunnet Head and Duncansby Head are the swiftly rushing waters of the Pentland Firth, with the Pentland Skerries to the east and to the north those stepping-stones to Norway the Orkneys (with historic Scapa Flow) and Shetlands.

Southward from Duncansby is Sinclairs Bay, a deep indentation between Castle Keiss and Noss Head, with Girniga Castle and Castle Sinclair north and south of it. South of Wick the shore slopes inward, its general contour and lack of islands contrasting strangely with the Scotland's western coast, to Occumster, Latheron, Dunbeath and its castle, the Ord of Caithness, Helmsdale, Port Gower, Brora, Dunrobin Castle, Golspie, and Little Ferry to Dornoch and its firth. Here a spur of land juts out to Tarbat Ness. Then we enter Moray Firth, coming first to the narrow opening to Cromarty Firth between Dunskeath and Cromarty.

A LOW AND CURVING COASTLINE STRETCHING EASTWARD

Cromarty Firth runs along the north shore of Black Island from Nigg Bay to Invergordon, Dingwall, and Strathpeffer. South of Black Isle are Beauly Firth, Inverness, and Inverness Firth, at the mouth of which are Fortrose and Fort George. To the east is Nairn. Then, past the Bar, a low and curving coastline stretches eastward to Kinnaird's Head and Fraserburgh by Findhorn, Burghead, Lossiemouth, Spey Bay, Buckie, Portknockie, Cullen, Portsoy, Whitehills, Macduff, Pennan, and Rosehearty. There is a slight outward slope to the whaling port of Peterhead and Buchan Ness, after which comes a gradual inward slope past Port Errol and Cruden Bay to the great fishing port of Aberdeen between the mouths of the Dee and the Don and Girdle Ness.

South of Stonehaven cliffs is Dunottar Castle. Then come Bervie, Montrose, Arbroath, Carnoustie, and Broughty Ferry, at the mouth of the sandy Firth of Tay, some 12 miles seaward of which is the Inchcape Rock. The shore now extends south-eastward to St Andrews and Fife Ness, rounding which we enter the Firth of Forth, with Inchkeith and its lighthouse about midway between Kirkcaldy and Leith, with Edinburgh in the near distance. From Musselburgh, near Leith, the shore rises past Prestonpans to North Berwick, east of which is Tantallon Castle, and seaward of which is the Bass Rock with its seabirds, and the Isle of May to the north of it. A much indented coast, rising from 300 to 400 feet, leads past Dunbar and Eyemouth to the English border at Berwick-on-Tweed.

ISLANDS PRESERVING THE MEMORY OF ST CUTHBERT AND GRACE DARLING

Berwick stands on a hill to the north of the Tweed, with a lighthouse on its massive stone pier. Southward the coast is rocky, with a sandy strand. The barren Kyloe Hills rise above the Fenham flats. At Beal Point the sand widens and at low tide Holy Island, the ancient Lindisfarne, is connected with the mainland. The rocky hill of the Heugh is marked by a ruined lookout; what is left of the Priory and the church is near to it, and on St Cuthbert's islet is the ruined chapel. Farther south is Bamburgh Castle on a rocky height, the square tower of the church serving sailormen as a landmark. Out to sea are the Farne Islands, Longstone with a lighthouse memorable for its association with Grace Darling.

Next come North Sunderland Harbour and Snook (or North Sunderland) Point, Beadnell Bay, and Embleton Bay.

DUNSTANBURGH CASTLE ON ITS RIDGE OF BLACK COLUMNAR BASALT

The noble ruin of Dunstanburgh Castle is seen on the crest of a ridge of black columnar basalt amid the monotony of the sandhills. On the north side of the River Aln stands Alnmouth with its belfry chapel.

Warkworth Harbour is formed by the lower reach of the Coquet. Warkworth Castle has towers and a tall eight-sided keep. Coquet Island serves chiefly as a foundation for its lighthouse. The shore is low and sandy all along Druridge Bay to Snab Point. Cresswell Point, low and rocky, breaks the sandy shore. Then come Cambois Bay, the boulder stones of Horsebridge, the stone and timber piers of Blyth Harbour, and one sees Tynemouth Castle. A little way from Curry Point is St Mary's Island with its lighthouse. Past the cliff at Seaton Sluice, with Cullercoats at its edge, the land becomes a steep, grassy bank with a sandy foreshore.

The entrance to the coaly Tyne is marked by the sandstone cliff of Tynemouth Head, made more imposing by the remains of priory and castle. From Tynemouth and South Shields the River Tyne runs through the heart of a great coal district, taking Newcastle on its way. More sandhills follow when the river is left behind, varied by an occasional crop of limestone, as at Trow Point, or of rock, as at Marsden. Sunderland Harbour is marked by Roker Cliff and its old battery. The ensuing grassy bank of the coast beyond the River Wear is intersected at Henden, Ryhope, and Seaham by deep ravines

THE TALL MONUMENT TO CAPTAIN COOK THAT RISES FROM EASBY MOOR

Southward of Seaham Harbour, with its piers and docks, low limestone cliffs are interrupted by stretches of sand, with the castellated tower of Kinley Hill prominent. Then we reach Tees Bay and Hartlepool on the low rocky extremity of the Heugh, where the noble church of St Hilda and the spire of St Mary's stand up finely. From Seaton Carew to the Tees estuary are more sandhills, which continue to Redcar. The moors are behind.

Between Redcar and Marske the tall monument to Captain Cook on Easby Moor can be seen, and at Saltburn the land climbs to Whitby, with its memories of Caedmon and St Hilda, whence cliffs from 100 to 600 feet high extend for eleven miles, broken only at Staithes, near Sandsend and Mulgrave Castle. Redcliffe is one of the boldest features of the Yorkshire coast, its deep red sandstone face rising 672 feet. Staithes Old Nab is low and black, and from it alum cliffs reach to Runswick Bay.

SCARBOROUGH, WHICH RISES PROUDLY WITHIN ENCIRCLING HILLS

From Whitby to Robin Hood's Bay high dark cliffs continue to Hayburn Wyke, but fall gradually toward Scarborough, which rises proudly within encircling hills, with the ruined keep of its castle and the war memorial on Oliver's Mount. There is another line of red cliffs along the coast to Filey, where they give way to sand and grassy slopes till the chalk cliffs of Speeton are reached, and from here to Flamborough Head they are nearly perpendicular.

From Bridlington low cliffs of clay extend along Bridlington Bay to Kilnsea, beyond which is a narrow neck of land to Spurn Head and the mouth of the Humber, where the Bull light-vessel lies off Cleethorpes and Great Grimsby. Both shores of the Humber are skirted by wide flats. Outside and south of Grimsby is the Dogger Bank, and sandhills front the shore to the mouth of the Wash, the way marked by Saltfleet, Theddlethorpe, Mablethorpe, Sutton-on-Sea, Chapel St Leonards, and Ingoldmells Point.

Into the Wash, in which are the Boston and Lynn Deeps and Wisbech Channel, flow the Welland, Witham, Nene, Ouse, and other rivers, and its entrance is ten miles across between Skegness and Burnham flats. Passing Hunstanton with its lighthouse and cliff on the Norfolk coast we come to Gore Point amid its sandy hummocks, which stretch eastward to Scald Head, broken only by Thornham and Brancaster Harbours. Then we come to Wells and Blakeney, whose church is the most conspicuous object on the coast, and Cromer. On Blakeney marshes is a bird sanctuary. Sandy shore continues to Weybourne, whence to Cromer are quickly eroding cliffs, of boulder clay, gravel, and sand, with Cromer Church perilously near the edge.

WHERE YARMOUTH STANDS BETWEEN THE YARE AND THE SEA

Beyond Cromer, the cliffs rising and falling to Winterton, we pass Overstrand, Trimingham, Bacton's square church, and Happisburgh's embattled church tower; and beyond Winterton Ness are sand hills and sandy cliffs to Caister Point. Then come the notorious shoals of the Yarmouth Roads and Yarmouth standing on a strip of land between the Yare and the sea, making a brave show with its old church of St Nicholas, its Naval Hospital, its Nelson Monument, and its fishing fleet.

From Yarmouth to Lowestoft Ness, the most easterly point of England, there are cliffs for three miles, succeeded by sandy beach Low cliffs then extend to Southwold and Thorpeness, when shingle succeeds them, continuing past Aldeburgh, near where much erosion has caused the disappearance of once familiar landmarks. Soon after we reach Felixstowe, and Landguard Point at the entrance to Harwich Harbour, where the Orwell and the Stour meet and the L.N.E.R. has a port for Continental traffic.

From the Naze, past Walton-on-the-Naze, Clacton, the low, marshy, embanked coastline of the Thames Estuary runs south-west to Shoeburyness past the mouths of the Colne, the Blackwater, and the Crouch. Between Foulness Point and Shoeburyness are the Foulness and Maplin Sands. Eastward of the Isle of Grain, at the confluence of Thames and Medway, we come to the Isle of Sheppey, separated from the Kent coast by the narrow winding Swale, with Sheerness and its dockyard at its north-west corner, Queenborough where the Swale joins the Medway, and Minster. Then follow Shell Ness, Whitstable, the home of the " native," Swalecliffe, Herne Bay, Reculver (the Roman Regulbium) and its two towers, Birchington, Westgate-on-Sea, and Margate. From Margate to Long Nase are low chalk cliffs with a stony foreshore.

SHORES ON WHICH ST AUGUSTINE LANDED AND WHERE CAESAR CAME

Round the point are the North Foreland with one of our oldest lighthouses, Broadstairs, Ramsgate, Pegwell Bay, and Ebbsfleet where St Augustine landed, and the low shore with hills behind it where Caesar came. Near by are the Sandwich flats and Richborough. From the Downs, off which are the Goodwin Sands, we see Deal and Walmer Castle, where the Duke of Wellington died, and as Kingsdown is passed the land rises to delightful St Margaret's Bay.

Round the South Foreland and its lighthouse is Dover Bay with two high cliffs and a valley between, and the ancient castle, great harbour, and Shakespeare Cliff. Soon afterwards we pass the harbours of Newhaven and Folkestone with its splendid Leas, whence to Hythe the coast gradually diminishes in height, with a few protuberances here and there. Romney Marsh behind its shingle bank is saved from the sea only by Dymchurch wall, but Dungeness Point is said to be pushing out seaward at the rate of 14 feet a year. Beyond the shallow indentation of Rye Bay lies Winchelsea, which is now high and dry.

Toward Hastings the coast rises again and sweeps in a long ridge from Battle to Fairlight Cliffs, to diminish again as Pevensey Bay opens and we see among the marshes the ruins of the Roman fort of Anderida. Eastbourne comes in sight nestling in the shadow of Beachy Head, off which is Belle Toute lighthouse and beyond which a fine succession of cliffs, with Cuckmere Haven between, rise to Seaford, where the Ouse Valley breaks their line to Brighton.

EMSWORTH AND BOSHAM ON THE LARGE LAGOON OF CHICHESTER HAVEN

A low foreshore follows to Portsmouth, broken by low gravel cliffs between Hill Head and Brown Down opposite Wootton Creek in the Isle of Wight. On the way are Shoreham, Lancing, Worthing, Littlehampton, with Arundel Castle in the distance, and Bognor Regis. From Selsey Bill, reminding us of the Selsea now under the sea, to Chichester Harbour the coast is very low, with Emsworth and Bosham, to the east of Hayling Island, on the large lagoon of Chichester Haven.

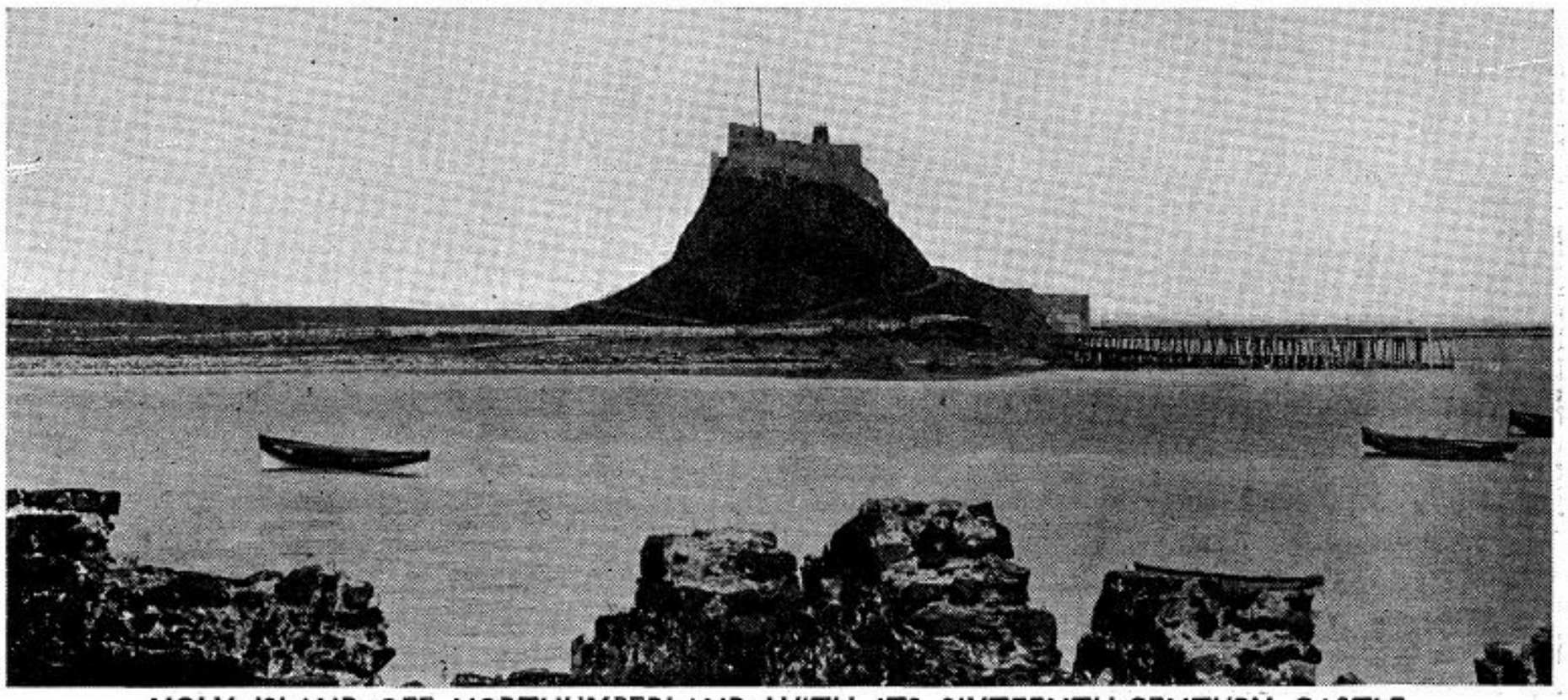
Beyond Langston Harbour and Hayling Island, with a high shingle beach, Southsea opens before us as we approach Portsmouth and historic Spithead. On the eastern side of Portsmouth Harbour are the White Hot Walls and redoubts, on the west Gosport and Haslar Hospital, and, in the distance, Porchester Castle.

To the south the Isle of Wight spreads westward from Bembridge, with Seaview, Ryde, climbing up its hill, Cowes on its little River Medina, Newtown, and Yarmouth. Rounding Sconce Point and Cliff End and passing through Colwell, Totland, and Alum Bays we come to the Needles and their lighthouse jutting out below the frowning down above. On its southern front the Isle is continued to St Catherine's Point past Freshwater Bay and the cliffs crowned by Tennyson's Cross. To the north of St Catherine's are Ventnor, Shanklin, Bonchurch, and Culver Cliff, and we are at Bembridge again.

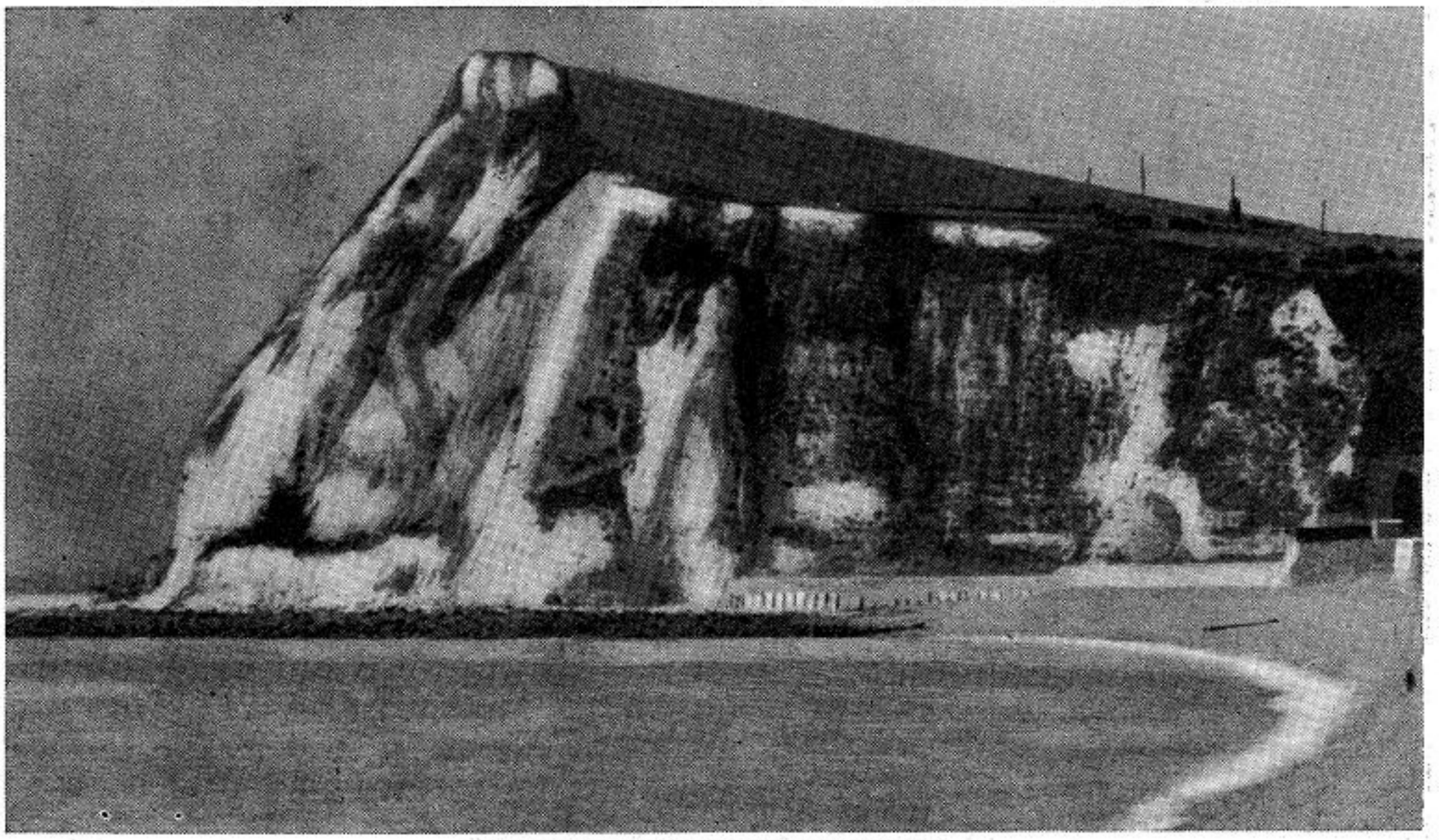
A WATERWAY NEVER WITHOUT INTEREST AND ATTRACTIVENESS

From Portsmouth the coast toward Southampton Water rises little above the sea. Stokes Bay and Lee-on-the-Solent are backed by woods. The shore is broken by creeks and there are mudbanks at Hamble Point, where the Hamble flows in past Bursledon. Netley Hospital seems set in green. Behind it is Netley Abbey. At low water the shoals stretch out. But the waterway with its varied shipping and yachting is never without interest and attractiveness.

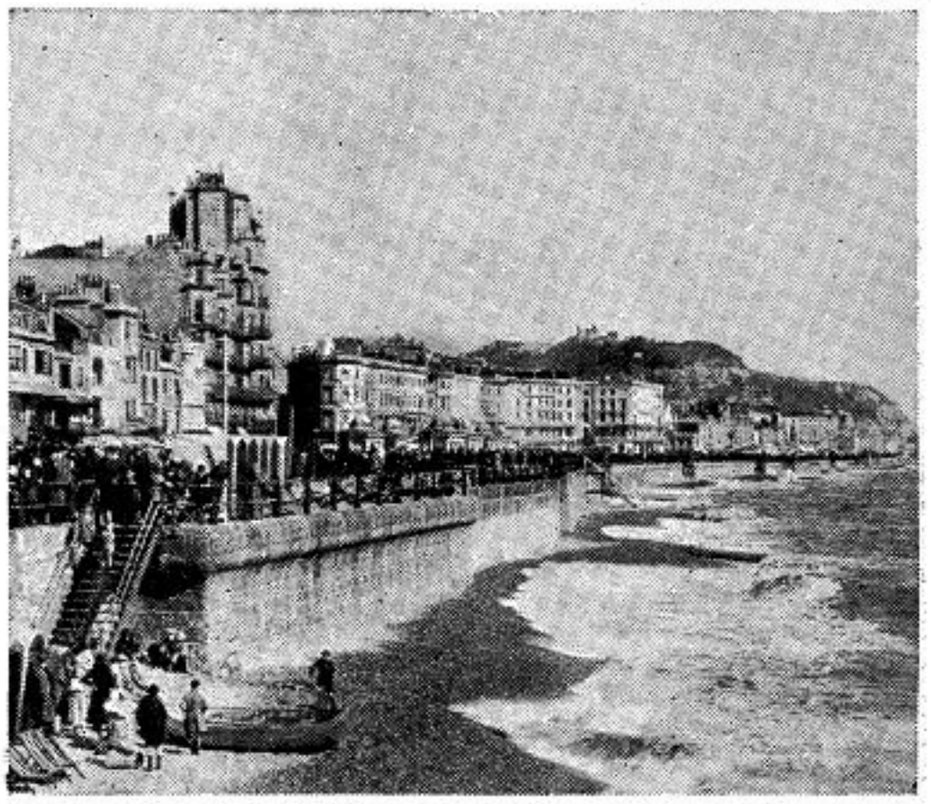
THE COASTS OF OUR HOMELAND



HOLY ISLAND OFF NORTHUMBERLAND WITH ITS SIXTEENTH-CENTURY CASTLE



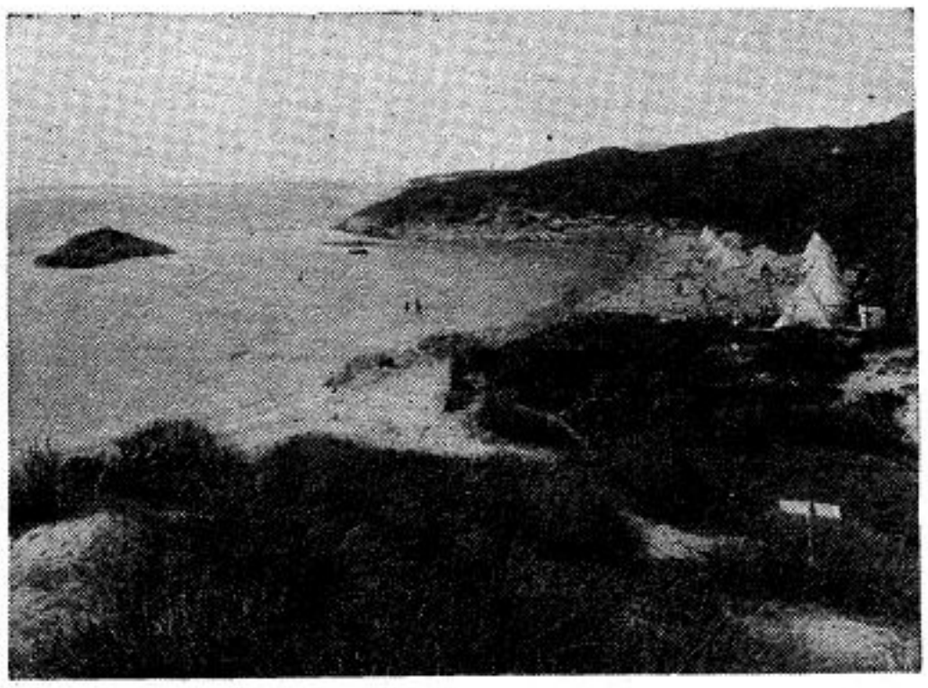
SHAKESPEARE'S CLIFF AT DOVER



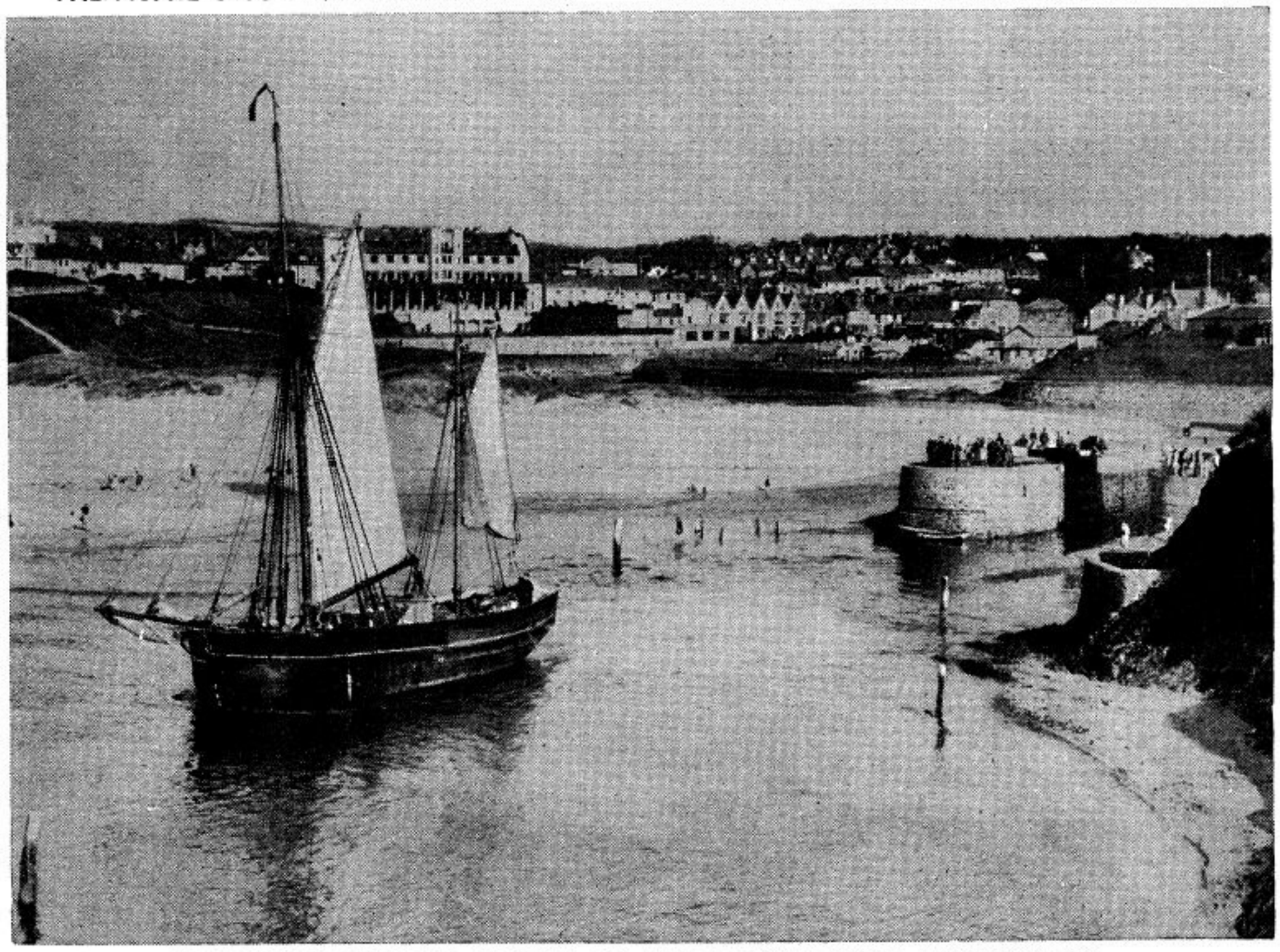
THE PROMENADE AT HASTINGS

YACHTS OFF WEST PIER AT BRIGHTON

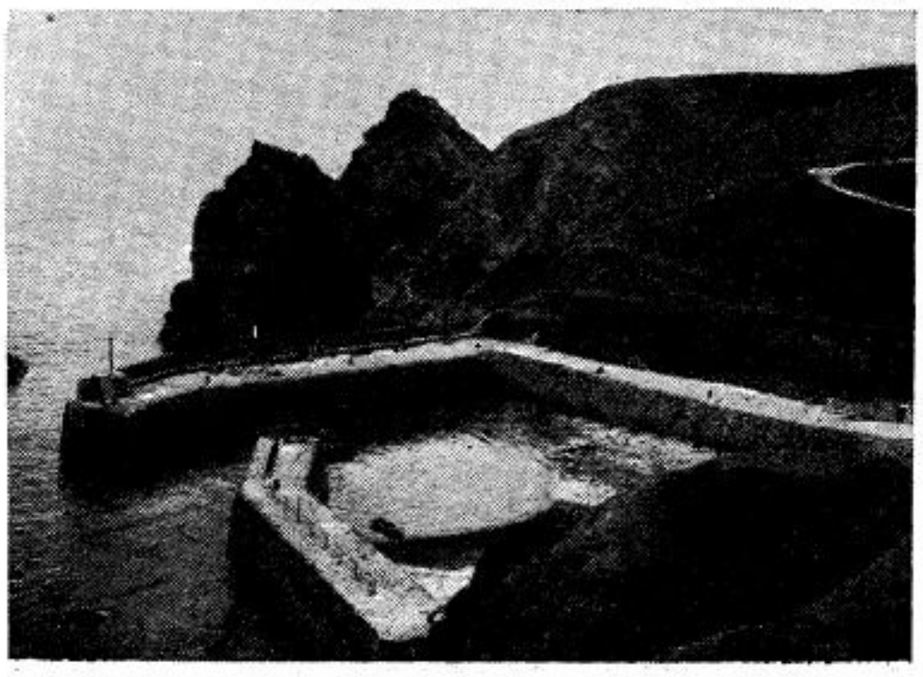
THE MUMBLES COAST, GLAMORGANSHIRE



A LITTLE BAY AT BORTH-Y-GEST, CARDIGANSHIRE

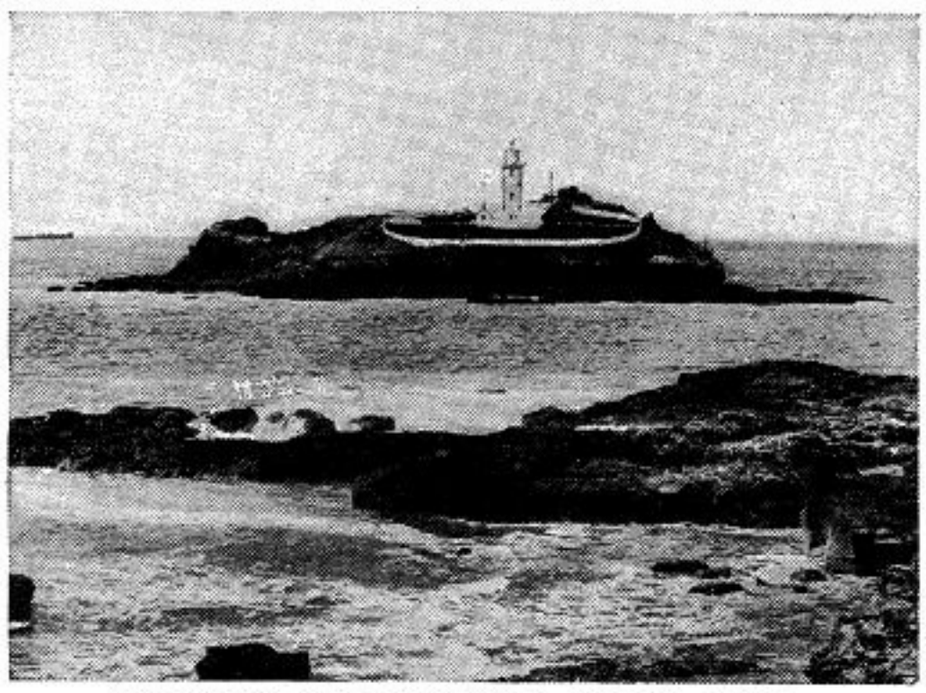


THE LITTLE SEAPORT OF BUDE ON THE NORTH COAST OF CORNWALL

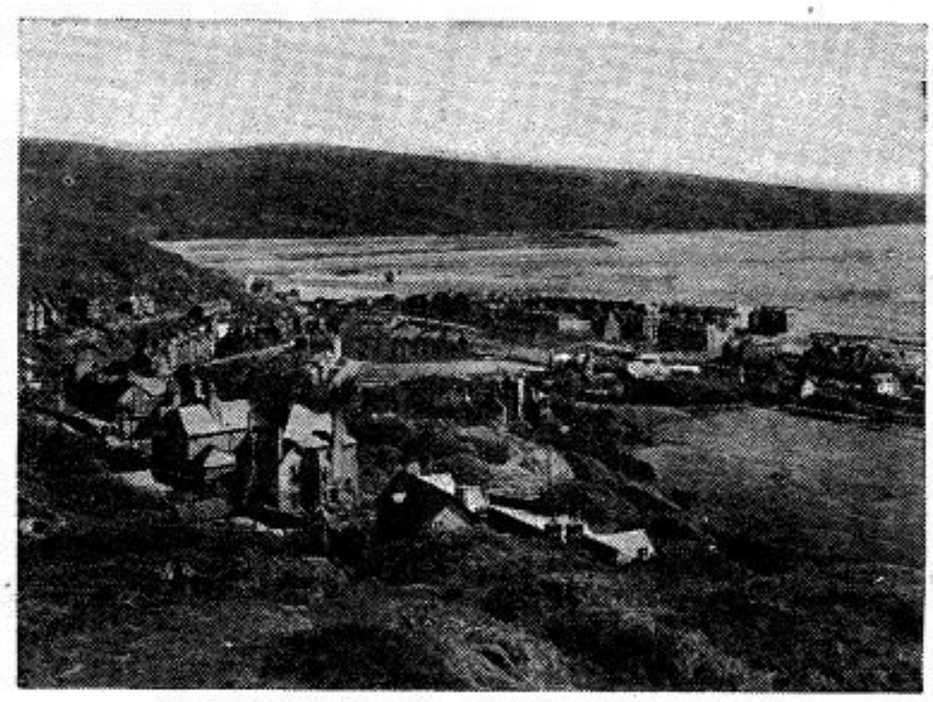


MULLION COVE IN CORNWALL

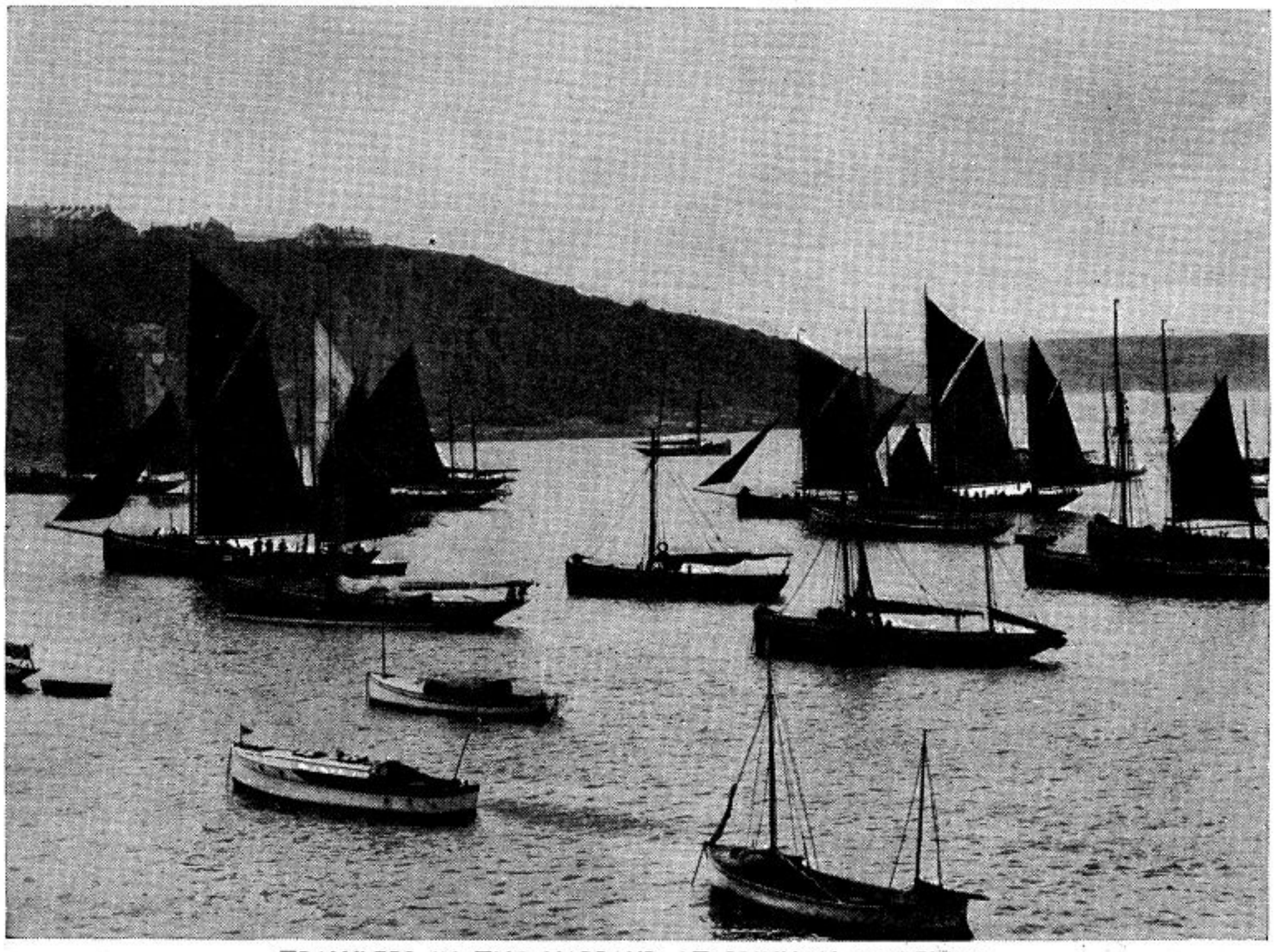
THE DORSET COAST AT LYME REGIS



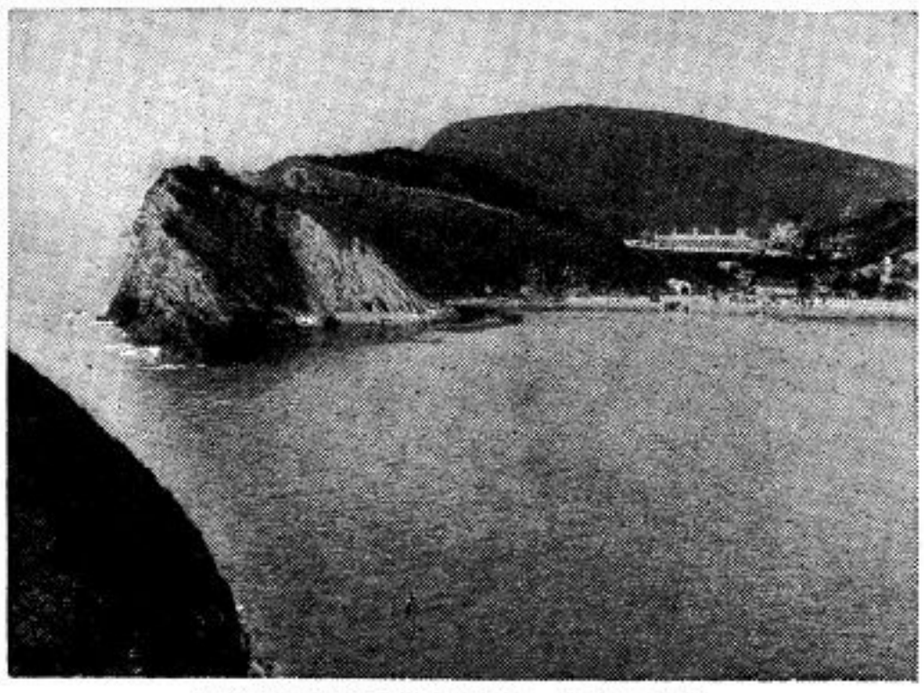
GODREVY LIGHTHOUSE AT ST IVES



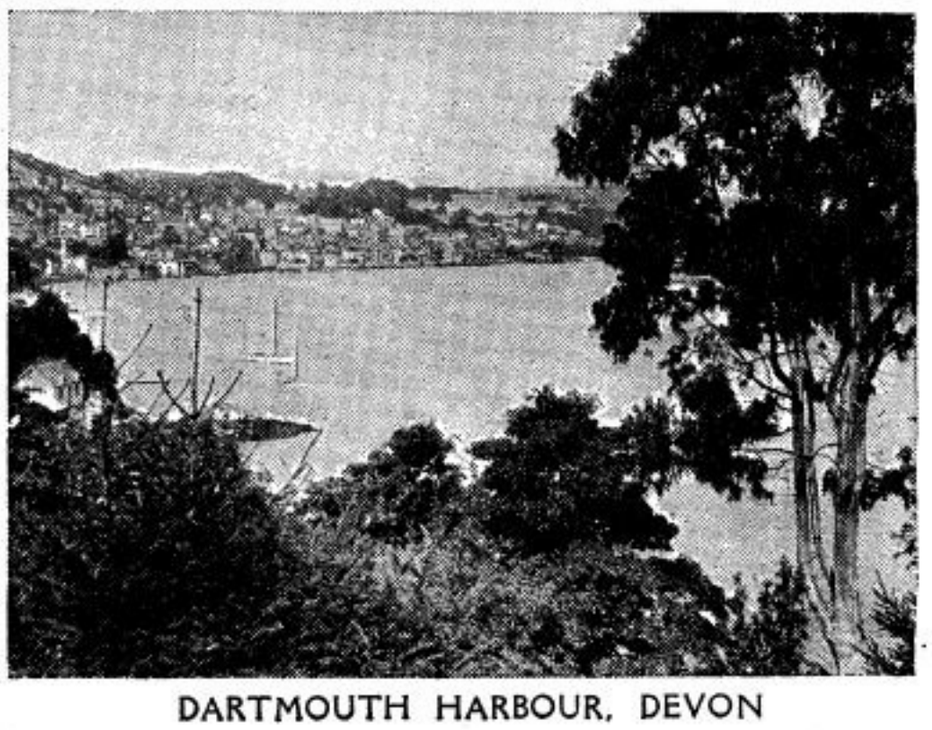
BARMOUTH IN MERIONETHSHIRE



TRAWLERS IN THE HARBOUR AT BRIXHAM IN DEVON

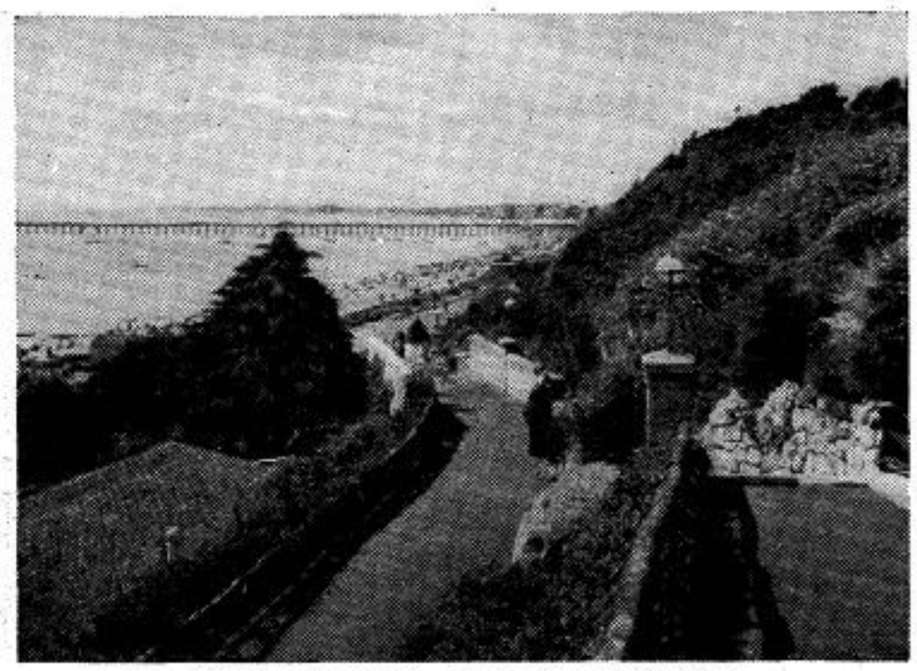


LULWORTH COVE, DORSET

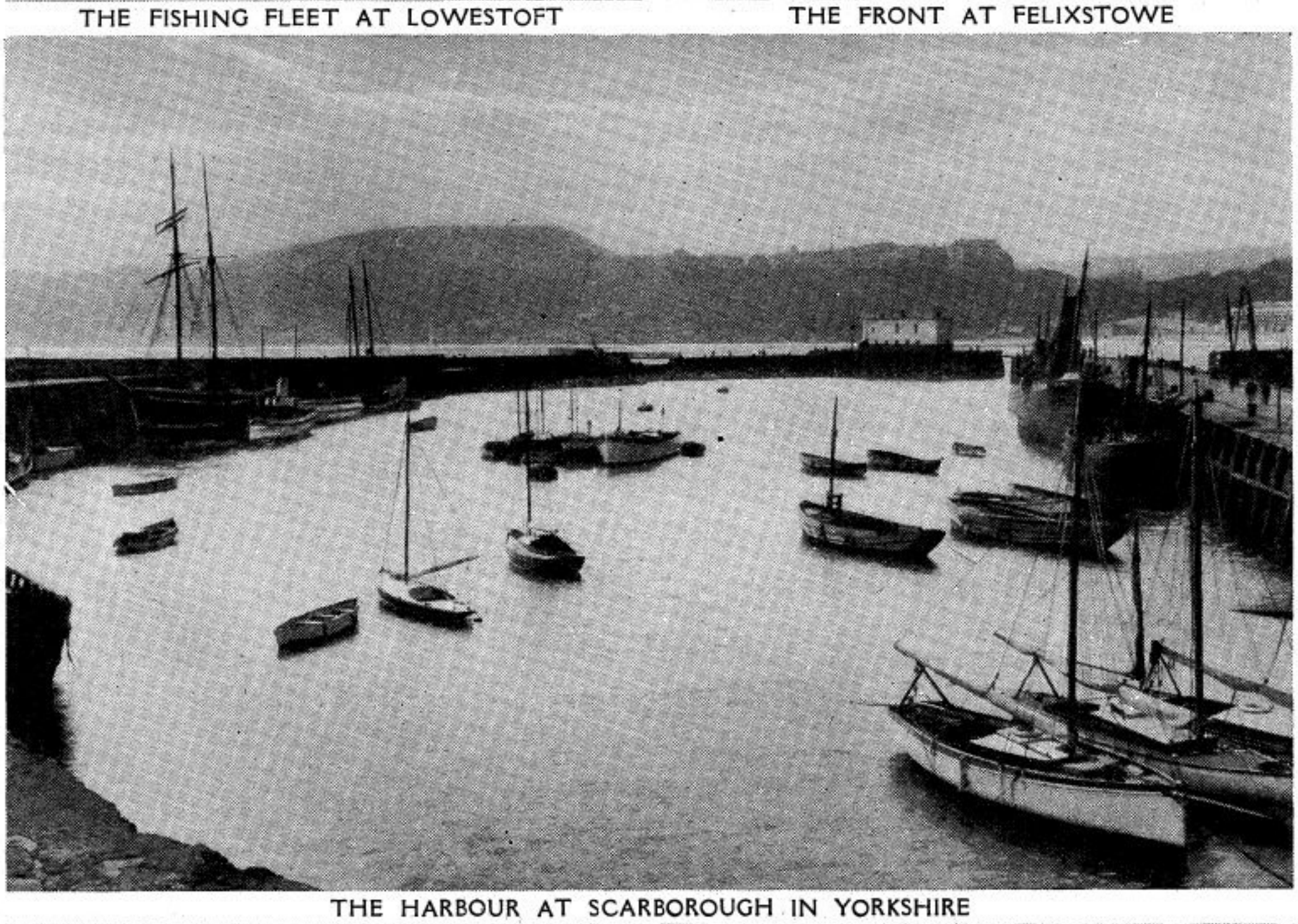


DARTMOUTH HARBOUR, DEVON

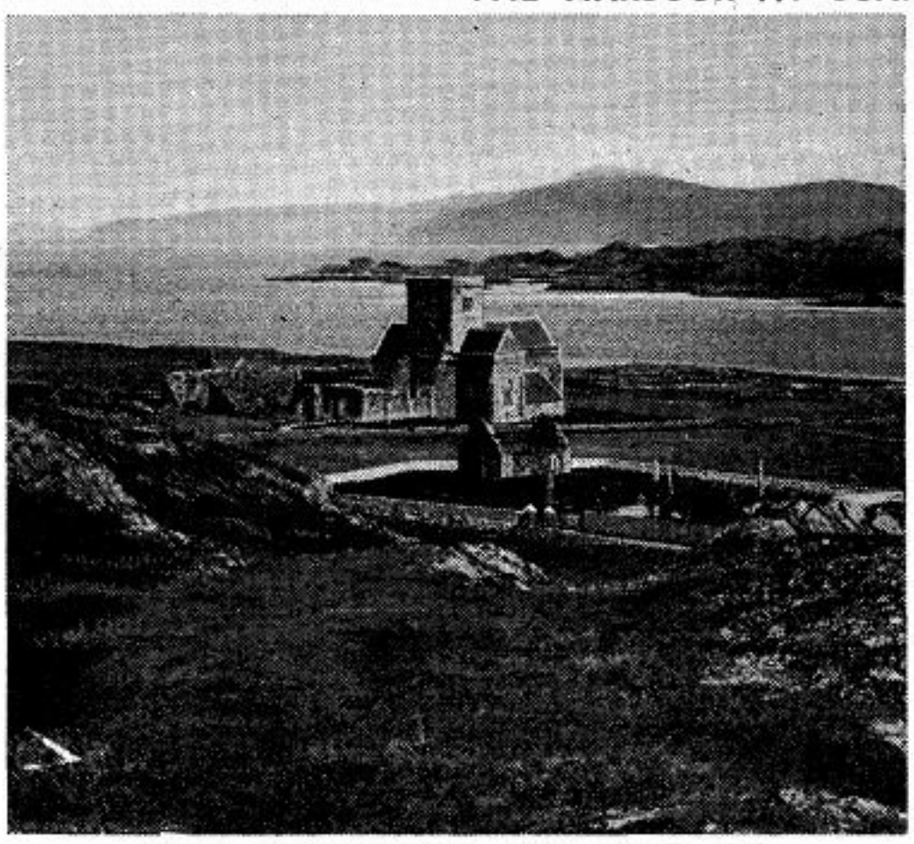
THE FISHING FLEET AT LOWESTOFT



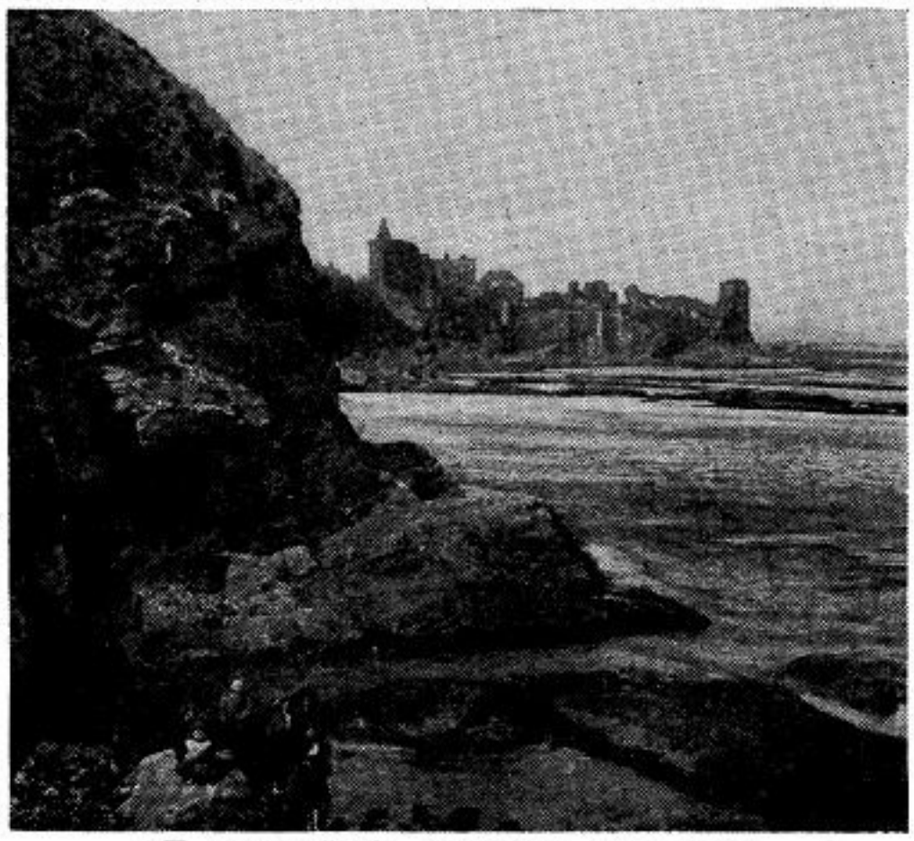
THE FRONT AT FELIXSTOWE



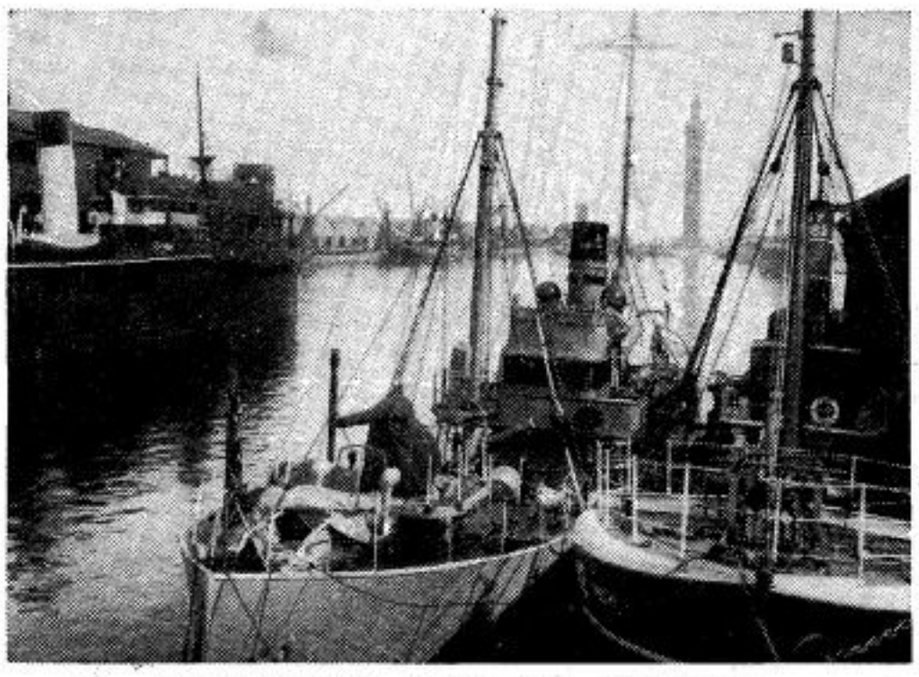
THE HARBOUR AT SCARBOROUGH IN YORKSHIRE



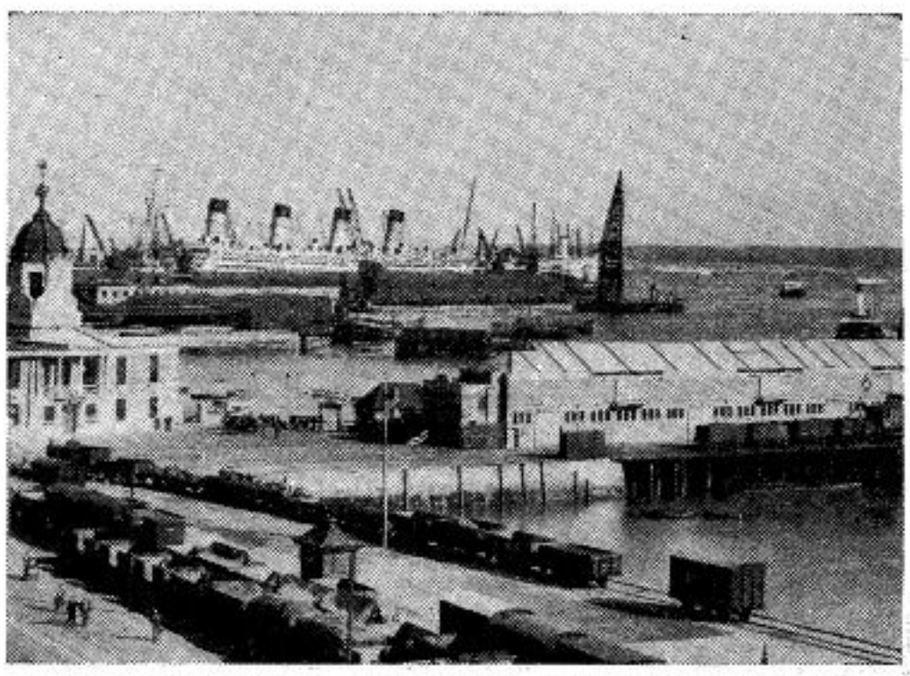
IONA CATHEDRAL ON ONE OF THE INNER HEBRIDES



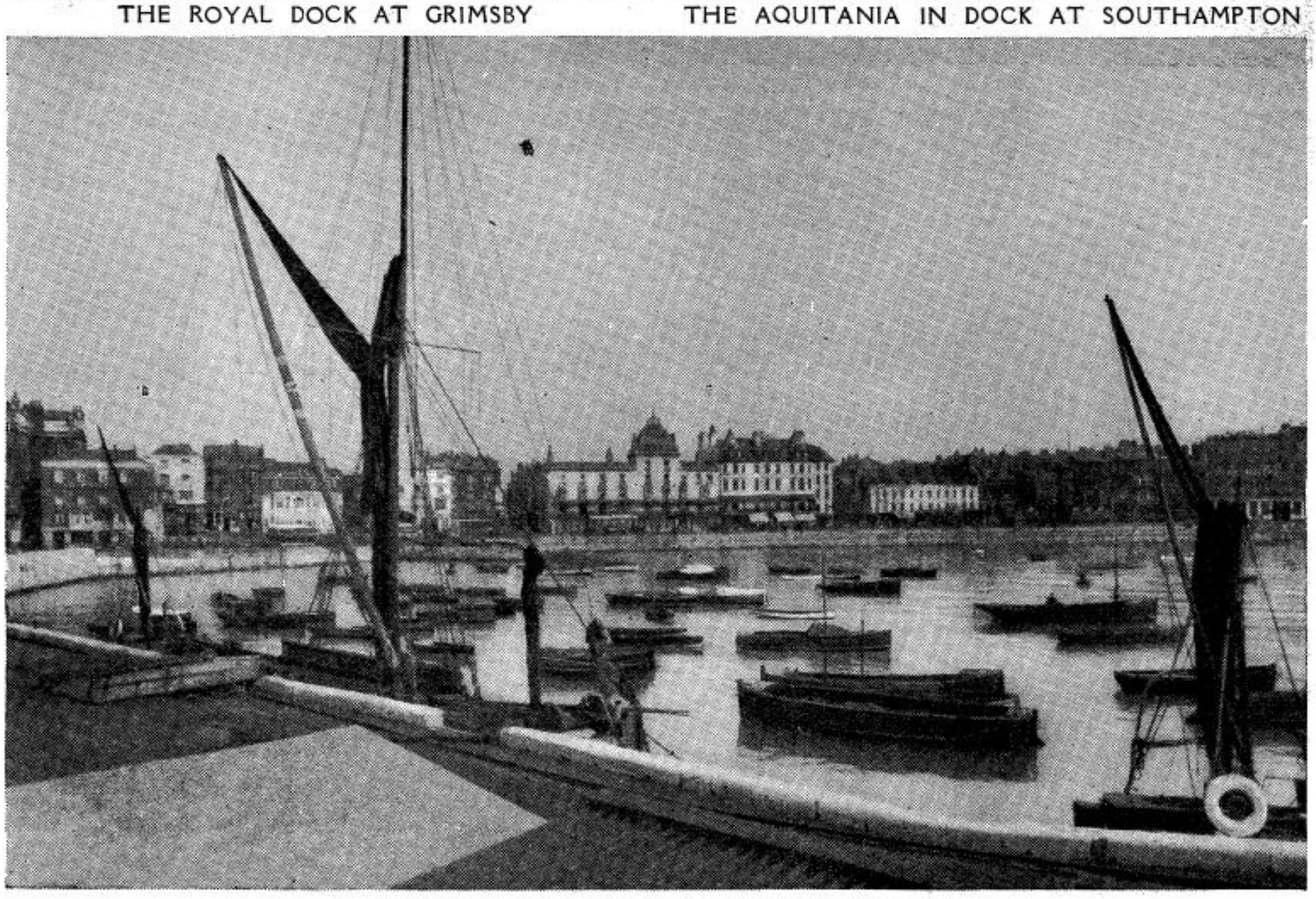
ST ANDREWS CASTLE ON THE COAST OF FIFESHIRE



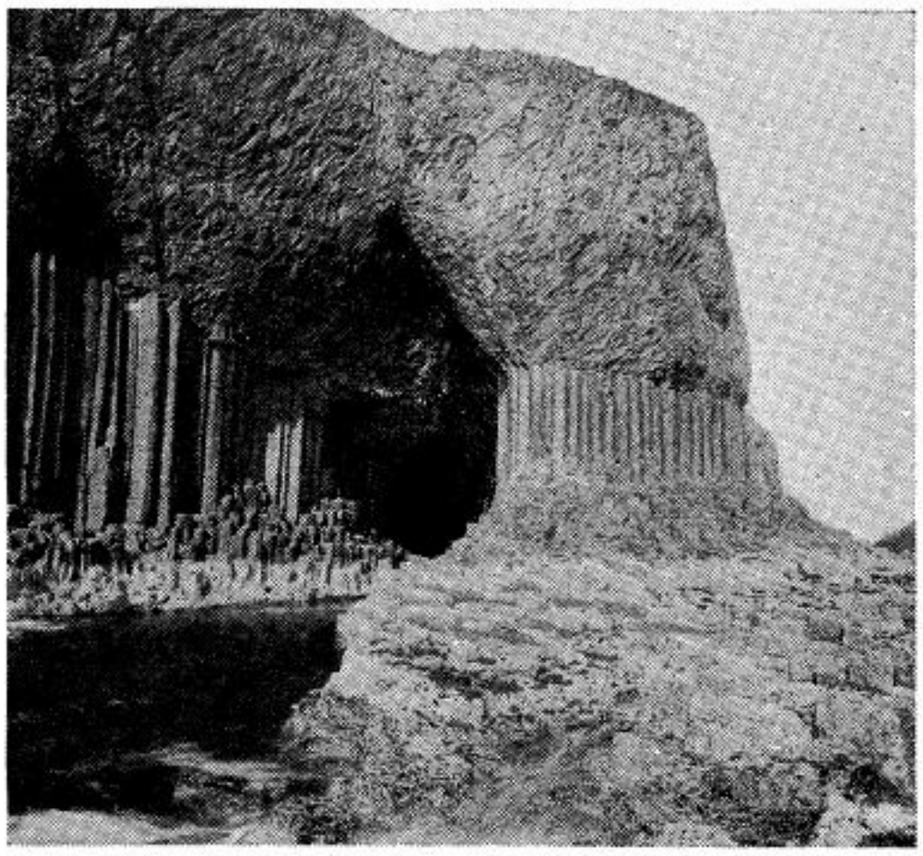
THE ROYAL DOCK AT GRIMSBY



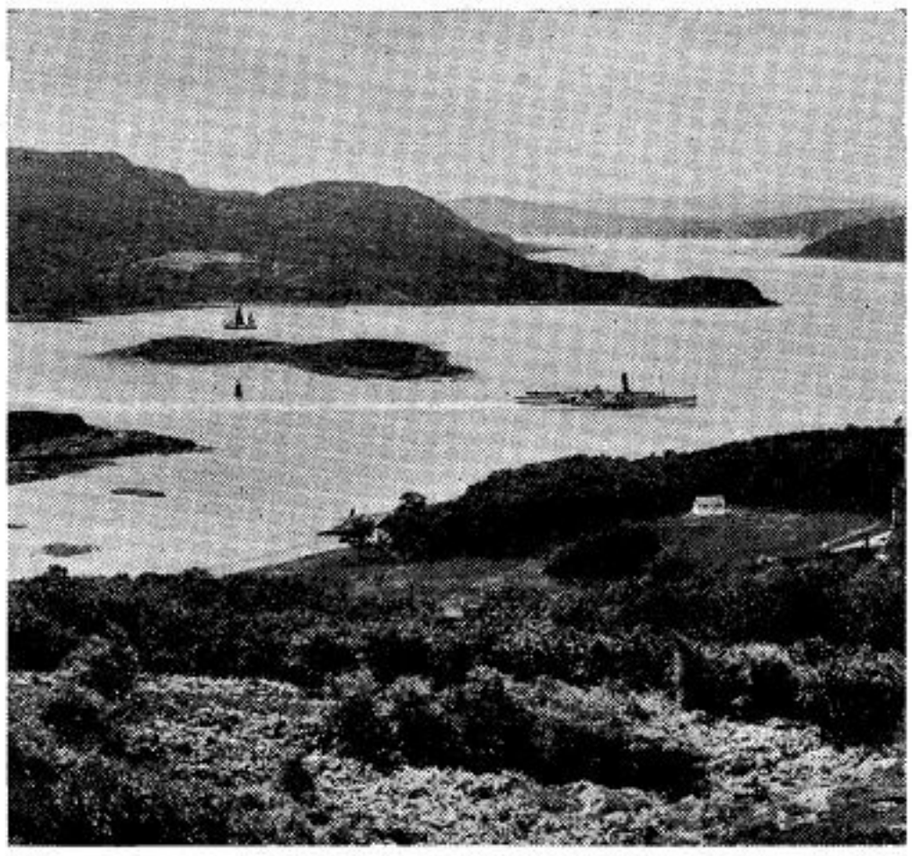
THE AQUITANIA IN DOCK AT SOUTHAMPTON



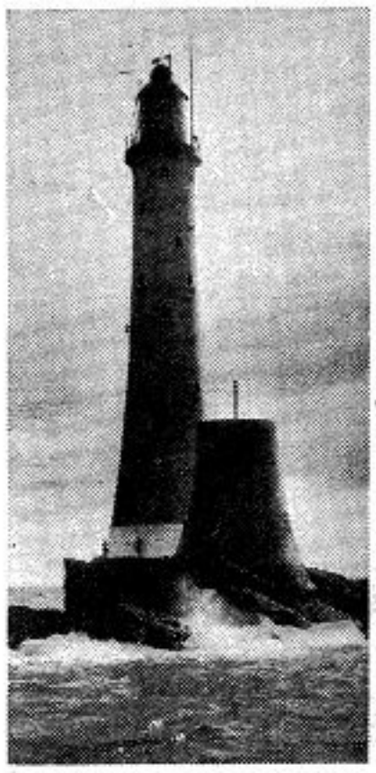
MARGATE, THE POPULAR THANET RESORT



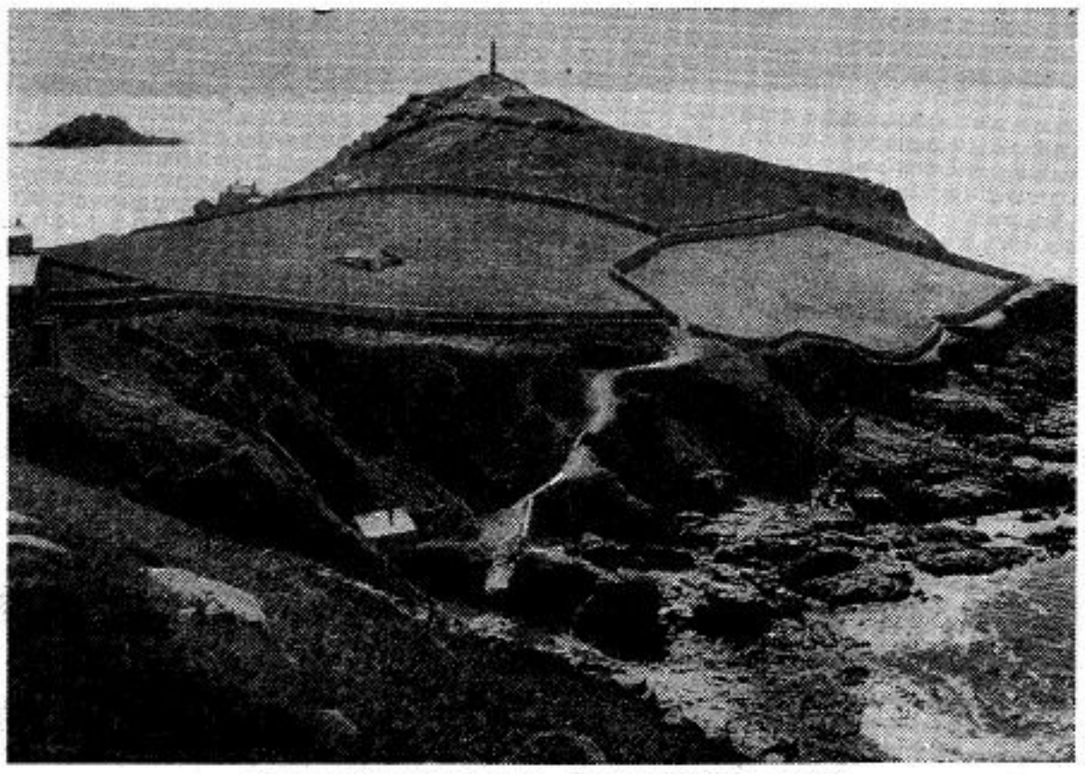
FINGAL'S CAVE IN THE ISLAND OF STAFFA



THE KYLES OF BUTE, ARGYLLSHIRE

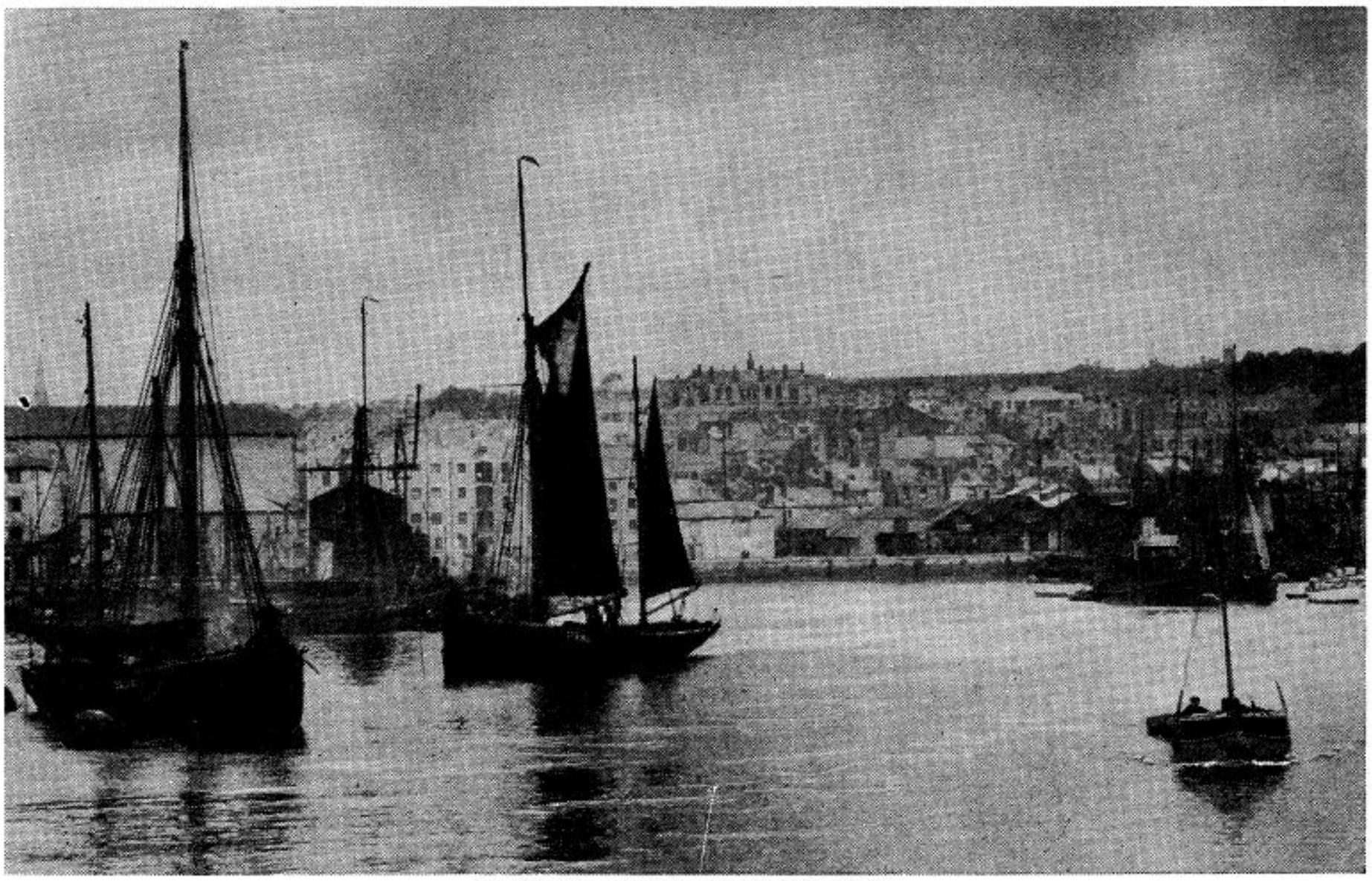


EDDYSTONE LIGHT

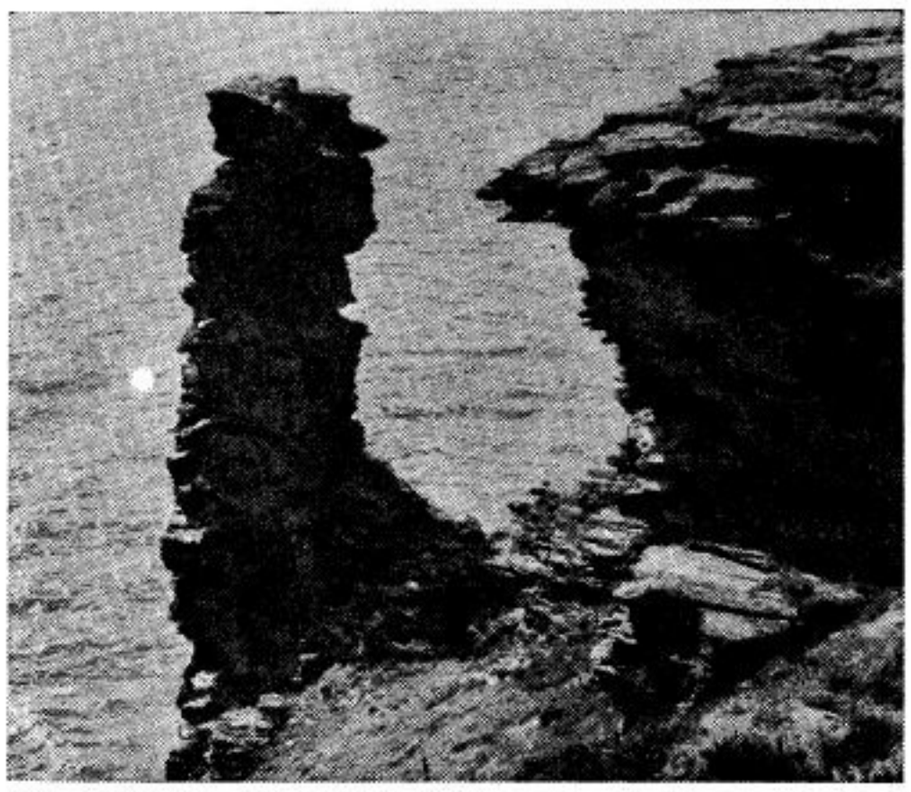


CAPE CORNWALL AT LAND'S END

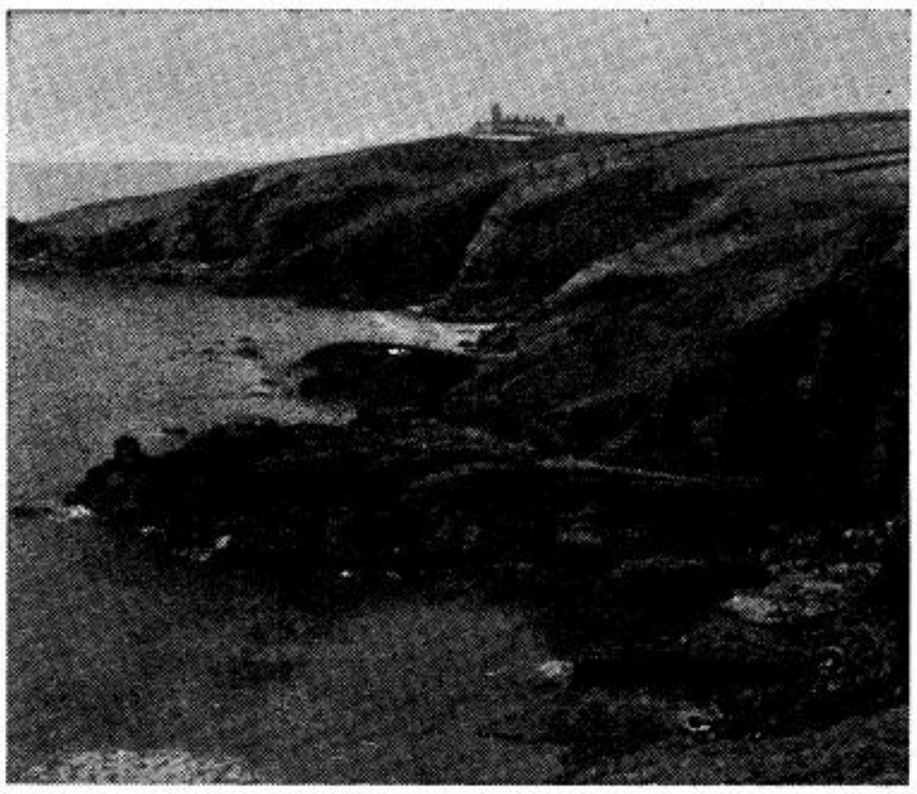
BLACKPOOL TOWER



THE BARBICAN AT PLYMOUTH



TINTAGEL HEAD, CORNWALL



LIZARD POINT, CORNWALL

THE FORSAKEN MERMAN

Matthew Arnold, if not in the very first rank of English poets, is still to be regarded as one of the greater of our modern writers. He was a lover of all that is manly, pure, and of good repute. The eldest son of Dr. Arnold of Rugby, one of England's most famous schoolmasters, he was born on December 24, 1822, and died on April 15, 1888. Most of his active life was spent as an inspector of schools, but for ten years he was also Professor of Poetry at Oxford. The poem we give here is one of his most delicate and fanciful pieces. Its charm is never lost.

COME, dear children, let us away;
Down and away below.
Now my brothers call from the bay;
Now the great winds shoreward blow;
Now the salt tides seaward flow;
Now the wild white horses play,
Champ and chafe and toss in the spray.
Children dear, let us away.
This way, this way!

Call her once before you go,
Call her once yet
In a voice that she will know:
"Margaret! Margaret!"
Children's voices should be dear
(Call once more) to a mother's ear:
Children's voices, wild with pain.
Surely she will come again.
Call her once and come away,
This way, this way!
"Mother dear, we cannot stay."
The wild white horses foam and fret.
Margaret! Margaret!

Come, dear children, come away down.
Call no more.
One last look at the white-walled town
And the little grey church on the windy shore.
Then come down.
She will not come though you call all day.
Come away, come away.

Children dear, was it yesterday
We heard the sweet bells over the bay?
In the caverns where we lay,
Through the surf and through the swell,
The far-off sound of a silver bell?
Sand-strewn caverns, cool and deep,
Where the winds are all asleep;
Where the spent lights quiver and gleam;
Where the salt weed sways in the stream;
Where the sea-beasts, ranged all round,
Feed in the ooze of their pasture ground;
Where the sea-snakes coil and twine,
Dry their mail, and bask in the brine;
Where great whales come sailing by,
Sail and sail, with unshut eye,
Round the world for ever and aye?
When did music come this way?
Children dear, was it yesterday?

Children dear, was it yesterday
(Call yet once) that she went away?
Once she sat with you and me
On a red-gold throne in the heart of the sea,
And the youngest sat on her knee.
She combed its bright hair, and she tended it well,
When down swung the sound of the far-off bell.
She sighed, she looked up through the clear green sea.
She said: "I must go, for my kinsfolk pray
In the little grey church on the shore today.
'Twill be Easter-time in the world—ah, me!
And I lose my poor soul, Merman, here with thee."

I said: "Go up, dear heart, through the waves.
Say thy prayer, and come back to the kind sea-caves."
She smiled, she went up through the surf in the bay.
Children dear, was it yesterday?

Children dear, were we long alone?
"The sea grows stormy, the little ones moan.
Long prayers," I said, "in the world they say.
Come," I said, and we rose through the surf in the bay.
We went up the beach, by the sandy down
Where the sea-stocks bloom, to the white-walled town,
Through the narrow, paved streets, where all was still,
To the little grey church on the windy hill.
From the church came a murmur of folk at their prayers,
But we stood without in the cold-blowing airs.
We climbed on the graves, on the stones worn with rains,
And we gazed up the aisle through the small leaded panes.
She sat by the pillar; we saw her clear;
"Margaret, hist! Come quick, we are here.
Dear heart," I said, "we are long alone.
The sea grows stormy, the little ones moan."
But, ah! she gave me never a look,
For her eyes were sealed to the holy book.
Loud prays the priest; shut stands the door.
Come away, children, call no more.
Come away, come down, call no more.

Down, down, down;
Down to the depths of the sea.
She sits at her wheel in the humming town,
Singing most joyfully.
Hark what she sings: "O joy, O joy,
For the humming street, and the child with its toy,
For the priest, and the bell, and the holy well,
For the wheel where I spun,
And the blessed light of the sun."
And so she sings her fill,
Singing most joyfully,
Till the shuttle falls from her hand
And the whizzing wheel stands still.

She steals to the window and looks at the sand;
And over the sand at the sea;
And her eyes are set in a stare,
And anon there breaks a sigh,
And anon there drops a tear
From sorrow-clouded eye
And a heart sorrow-laden,
A long, long sigh,
For the cold, strange eyes of a little Mermaiden,
And the gleam of her golden hair.

Come away, away children,
Come children, come down;
The hoarse wind blows colder;
Lights shine in the town.
She will start from her slumber
When gusts shake the door;
She will hear the winds howling,
Will hear the waves roar.
We shall see, while above us
The waves roar and whirl,
A ceiling of amber,
A pavement of pearl.
Singing: "Here came a mortal,
But faithless was she;
And alone dwell for ever
The kings of the sea."

But, children, at midnight,
When soft the winds blow;
When clear falls the moonlight,
When spring-tides are low;
When sweet airs come seaward
From heaths starred with broom,
And high rocks throw mildly
On the blanched sands a gloom;
Up the still, glistening beaches,
Up the creeks we will hie;
Over banks of bright seaweed
The ebb-tide leaves dry.
We will gaze from the sand-hills
At the white, sleeping town,
At the church on the hillside—
And then come back down.
Singing: "There dwells a loved one,
But cruel is she;
She left lonely for ever
The kings of the sea."

THE END OF LIFE

These four fine lines are those most quoted from the long poem "Festus," by Philip James Bailey (1816–1902), a Nottingham poet, once much admired but now seldom read.

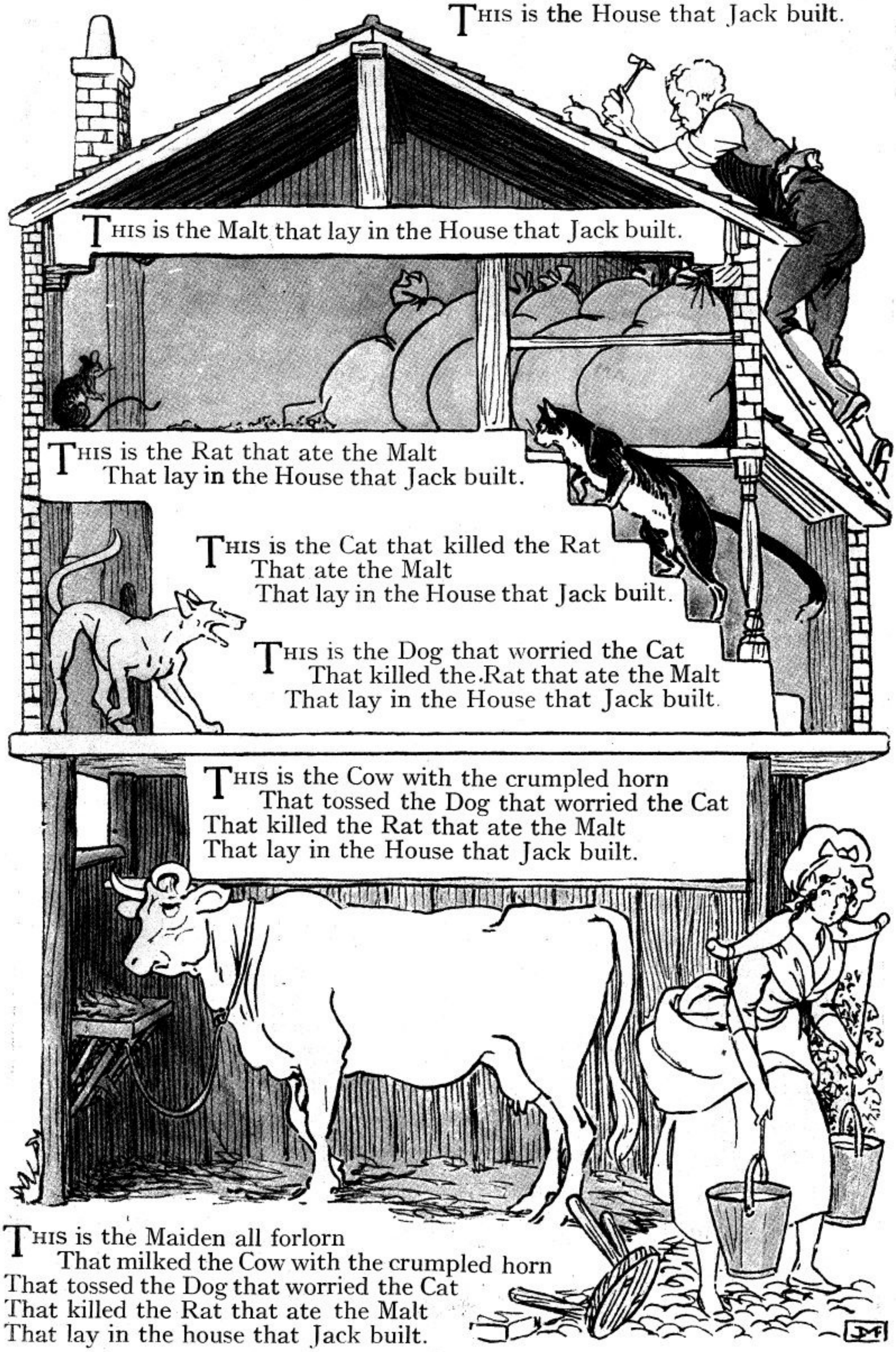
We live in deeds, not years; in thoughts, not breaths;
In feelings, not in figures on a dial.
We should count time by heart-throbs. He most lives
Who thinks most, feels the noblest, acts the best.

GIRLS AND BOYS COME OUT TO PLAY

Girls and boys come out to play, The moon doth shine as bright as day.
Leave your sup - per and leave your sleep: Come to your play - fel - lows in the street.
Come with a whoop and come with a call, Come with a good will or not at all.
Up the lad - der and down the wall, a half - pen - ny loaf will serve you all.

THIS IS THE HOUSE THAT JACK BUILT

THIS is the House that Jack built.



THIS is the Malt that lay in the House that Jack built.

THIS is the Rat that ate the Malt
That lay in the House that Jack built.

THIS is the Cat that killed the Rat
That ate the Malt
That lay in the House that Jack built.

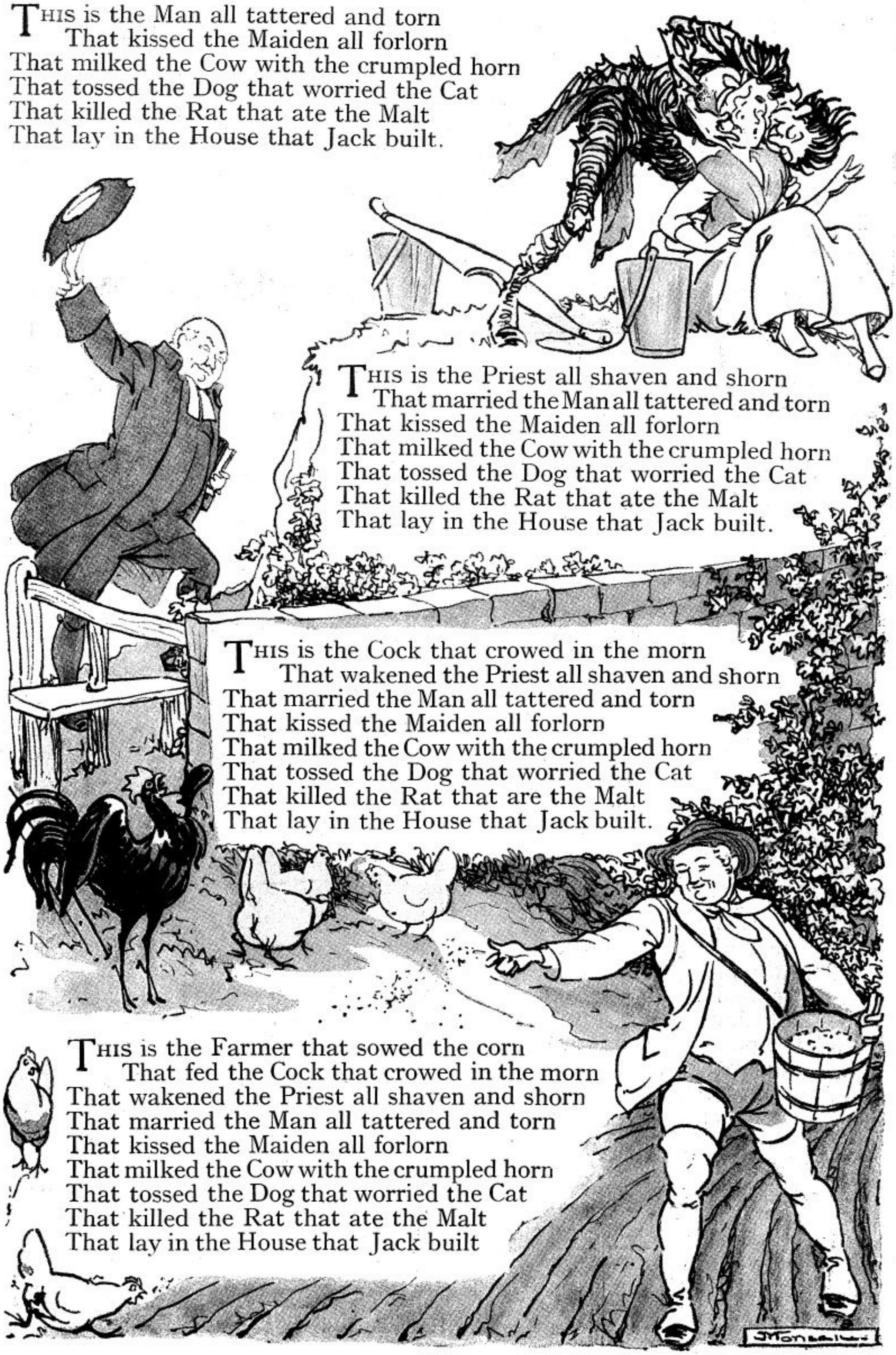
THIS is the Dog that worried the Cat
That killed the Rat that ate the Malt
That lay in the House that Jack built.

THIS is the Cow with the crumpled horn
That tossed the Dog that worried the Cat
That killed the Rat that ate the Malt
That lay in the House that Jack built.

THIS is the Maiden all forlorn
That milked the Cow with the crumpled horn
That tossed the Dog that worried the Cat
That killed the Rat that ate the Malt
That lay in the house that Jack built.

THIS IS THE MAN ALL TATTERED AND TORN

THIS is the Man all tattered and torn
That kissed the Maiden all forlorn
That milked the Cow with the crumpled horn
That tossed the Dog that worried the Cat
That killed the Rat that ate the Malt
That lay in the House that Jack built.

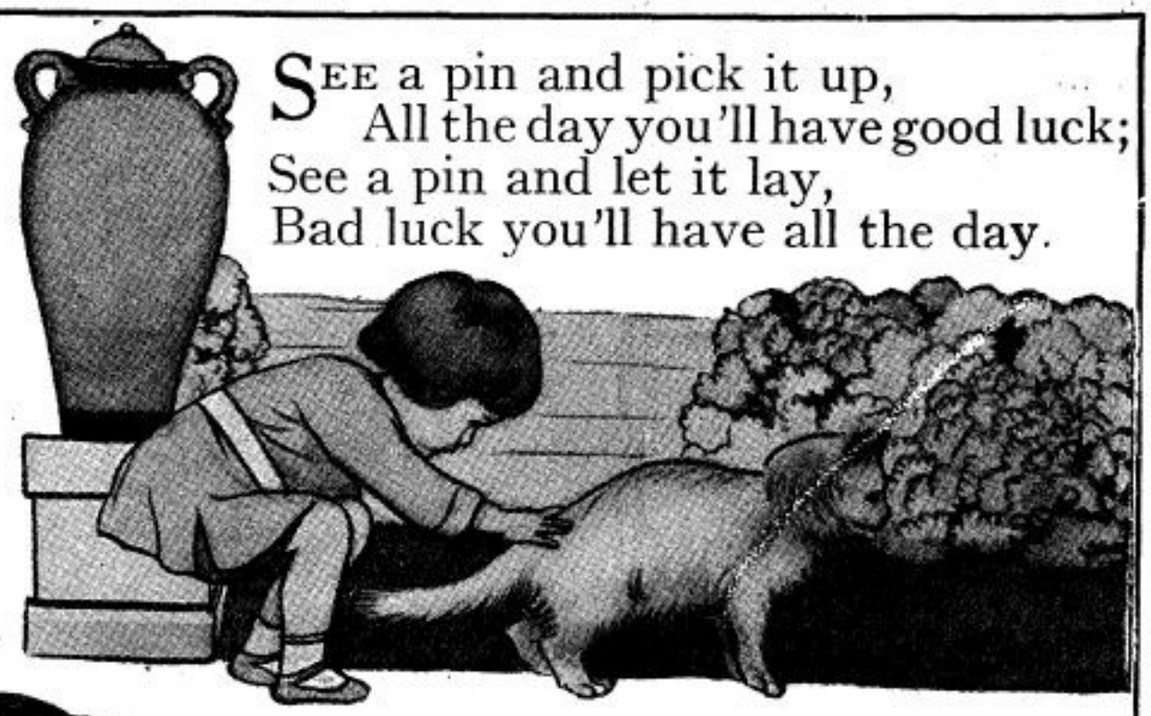


THIS is the Priest all shaven and shorn
That married the Man all tattered and torn
That kissed the Maiden all forlorn
That milked the Cow with the crumpled horn
That tossed the Dog that worried the Cat
That killed the Rat that ate the Malt
That lay in the House that Jack built.

THIS is the Cock that crowed in the morn
That wakened the Priest all shaven and shorn
That married the Man all tattered and torn
That kissed the Maiden all forlorn
That milked the Cow with the crumpled horn
That tossed the Dog that worried the Cat
That killed the Rat that are the Malt
That lay in the House that Jack built.

THIS is the Farmer that sowed the corn
That fed the Cock that crowed in the morn
That wakened the Priest all shaven and shorn
That married the Man all tattered and torn
That kissed the Maiden all forlorn
That milked the Cow with the crumpled horn
That tossed the Dog that worried the Cat
That killed the Rat that ate the Malt
That lay in the House that Jack built

I LOVE little pussy,
Her coat is so warm,
And if I don't hurt her,
She'll do me no harm.
So I'll not pull her tail,
Or drive her away,
But pussy and I
Very gently will play.
She will sit by my side,
And I'll give her her food,
And she'll like me because
I am gentle and good.



SEE a pin and pick it up,
All the day you'll have good luck;
See a pin and let it lay,
Bad luck you'll have all the day.

MY house is red—a little house,
A happy child am I;
I laugh and play the livelong day,
I hardly ever cry.

I have a tree, a green, green tree,
To shade me from the sun;
And under it I often sit,
When all my work is done.

My little basket I will take,
And trip into the town.
When next I'm there I'll buy some cake,
And spend my bright half-crown.

MY dear, do you know,
How a long time ago
Two poor little children,
Whose names I don't know,
Were stolen away on a fine summer's day,
And left in a wood, as I've heard people say?
And when it was night,
So sad was their plight,
The sun it went down,
And the moon gave no light.
They sobbed and they sighed, and they bitterly cried,
And the poor little things, they lay down and died.
And when they were dead,
The robins so red
Brought strawberry-leaves,
And over them spread.
And all the day long
They sang them this song:
"Poor babes in the wood!
Poor babes in the wood!
And don't you remember the babes in the wood?"

I NEVER saw a Purple Cow,
I never hope to see one;
But I can tell you, anyhow,
I'd rather see than be one.

MARY MORISON

This most lovely song was written by Robert Burns while he was still at home, working on his father's farm and unknown to the world. There is a doubt who was meant by Mary Morison. The last two lines of the second and third verses are beautiful examples of saying much in the simplest of words. *Trysted* means *appointed; bide the stoure* means *endure the dust;* and *braw* means *handsome.*

O MARY, at thy window be,
It is the wished, the trysted hour,
Those smiles and glances let me see
That make the miser's treasure poor.
How blithely wad I bide the stoure,
A weary slave frae sun to sun,
Could I the rich reward secure,
The lovely Mary Morison.

Yestreen, when to the trembling string
The dance gaed through the lighted ha',
To thee my fancy took its wing;
I sat but neither heard nor saw:
Though this was fair, and that was braw,
And yon the toast of a' the town,
I sighed, and said amang them a',
"Ye are na Mary Morison."

O Mary, canst thou wreck his peace
Wha for thy sake wad gladly die?
Or canst thou break that heart of his
Whase only faut is loving thee?
If love for love thou wilt na gie,
At least be pity to me shown:
A thought ungentle canna be
The thought o' Mary Morison.

CONSIDER IT AGAIN

Arthur Hugh Clough, who wrote this poem, was a favourite scholar of Dr. Arnold, the famous headmaster of Rugby School. Clough had an undecided mind. He loved to think of every side of any question, and seldom came to any fixed conclusion. In the last verse he seems to regret that other people do not turn things over and over in their minds in the same way. But he did it too much. Yet he was a real poet, and made a considerable reputation.

OLD things need not be therefore true,
O brother men, nor yet the new;
Ah, still awhile the thought retain,
And yet consider it again!

The souls of now two thousand years
Have laid up here their toils and fears,
And all the earnings of their pain;
Ah, yet consider it again!

We! What do we see? Each a space
Of some few yards before his face;
Does that the whole wide plan explain?
Ah, yet consider it again!

Alas, the great world goes its way,
And takes the truth from each new day;
They do not quit, nor can retain,
Far less consider it again.

THE STARS

Barry Cornwall, whose real name was Bryan Waller Procter, wrote this little poem for all readers, young or old. In it he has caught the quiet beauty of the night, and you will notice that instead of expressing wonder as to what the stars may be he is content to think of them as among the glories of God's world, that fill our souls with reverent joy.

THEY glide upon their endless way,
For ever calm, for ever bright,
No blind hurry, no delay,
Mark the Daughters of the Night;
They follow in the track of Day,
In divine delight.

And oh! how still beneath the stars
The once wild, noisy Earth doth lie;
As though she now forsook her jars,
And caught the quiet of the sky.
Pride sleeps; and Love (with all his scars)
In smiling dreams doth lie.

Shine on, sweet orbed souls, for aye,
For ever calm, for ever bright:
We ask not whither lies your way,
Nor whence ye came, nor what your light.
Be still—a dream throughout the day,
A blessing through the night!

AN EVENING HYMN

One of the most beautiful of hymns for the evening hour is the following, written by the Rev. James Drummond Burns, a Scottish minister, who was born in 1823 and died at Mentone in 1864. Samuel, of course, was one of the great prophets of Israel, and in this hymn his qualities of mind and heart are chosen as worthy of our emulation.

HUSHED was the evening hymn,
The temple courts were dark;
The lamp was burning dim
Before the sacred ark,
When suddenly a voice divine
Rang through the silence of the shrine.

Oh, give me Samuel's ear—
The open ear, O Lord!
Alive and quick to hear
Each whisper of Thy word;
Like him to answer at Thy call,
And to obey Thee first of all.

Oh, give me Samuel's heart!
A lowly heart, that waits
When in Thy house Thou art;
Or watches at Thy gates
By day and night—a heart that still
Moves at the breathing of Thy will.

Oh, give me Samuel's mind!
A sweet, unmurmuring faith,
Obedient and resigned
To Thee in life and death:
That I may read, with child-like eyes,
Truths that are hidden from the wise.

A LAUGHING SONG

Many of William Blake's Nature songs, such as that given here, might be described as songs of the joy of the earth. The idea of Nature being glad is, of course, as ancient as thought; and we find such phrases in the Bible as "Let the hills be joyful" and "The trees of the field shall clap their hands."

When the green woods laugh with the voice of joy,
And the dimpling stream runs laughing by;
When the air does laugh with our merry wit,
And the green hill laughs with the noise of it;

When the meadows laugh with lively green,
And the grasshopper laughs in the merry scene;
When Mary, and Susan, and Emily,
With their sweet, round mouths sing, "Ha, ha, he!"

When the painted birds laugh in the shade,
Where our table with cherries and nuts is spread:
Come live, and be merry, and join with me
To sing the sweet chorus of "Ha, ha, he!"

MY BOAT IS ON THE SHORE

Lord Byron, a great poet, was a wayward, unwise man, and managed his life so badly that he had to leave his native land in great disfavour. In this poem to his faithful friend Tom Moore he pretended he did not care, but he was really very bitter in spirit. Byron's trust in his friend was well deserved. If he could have thought about more people in the same way he would have lived and died a far happier man.

My boat is on the shore
And my bark is on the sea;
But before I go, Tom Moore,
Here's a double health to thee!

Here's a sigh to those who love me,
And a smile to those who hate;
And, whatever sky's above me,
Here's a heart for every fate.

Though the ocean roar around me,
Yet it still shall bear me on:
Though a desert should surround me,
It hath springs that may be won.

Were't the last drop in the well,
As I gasped upon the brink,
Ere my fainting spirit fell
'Tis to thee that I would drink.

With that water as this wine,
The libation I would pour
Should be: "Peace with thine and mine,
And a health to thee, Tom Moore!"

THE PATRIOT

The first line of this poem by Robert Browning is one of the most quoted in modern poetry. The poem was written to illustrate the fickleness of popular applause. History abounds in examples of men who have been hailed as heroes by the mob and a little later have been hounded to death by the same mob. The wise man is he who has the strength to look with contempt upon the favour of the crowd, knowing that they who acclaim him a patriot would, if it served their purpose, denounce him as a traitor.

It was roses, roses, all the way,
With myrtle mixed in my path like mad;
The house-roofs seemed to heave and sway,
The church-spires flamed, such flags they had,
A year ago on this very day.

The air broke into a mist with bells,
The old walls rocked with the crowd and cries.
Had I said, "Good folk, mere noise repels;
But give me your sun from yonder skies!"
They had answered, "And afterward, what else?"

Alack, it was I who leaped at the sun
To give it my loving friends to keep!
Naught man could do have I left undone:
And you see my harvest, what I reap
This very day, now a year is run.

There's nobody on the house-tops now—
Just a palsied few at the windows set;
For the best of the sight is, all allow,
At the Shambles' Gate; or, better yet,
By the very scaffold's foot, I trow.

I go in the rain, and, more than needs,
A rope cuts both my wrists behind;
And I think, by the feel, my forehead bleeds,
For they fling, whoever has a mind,
Stones at me for my year's misdeeds.

Thus I entered, and thus I go!
In triumphs people have dropped down dead.
"Paid by the world, what dost thou owe
Me?" God might question; now, instead,
'Tis God shall repay; I am safer so.

THE SELKIRK GRACE

Robert Burns made rhymes to suit all occasions. This one is generally used at dinners held in his memory.

Some hae meat, and canna eat,
And some wad eat that want it;
But we hae meat and we can eat,
And sae the Lord be thankit.